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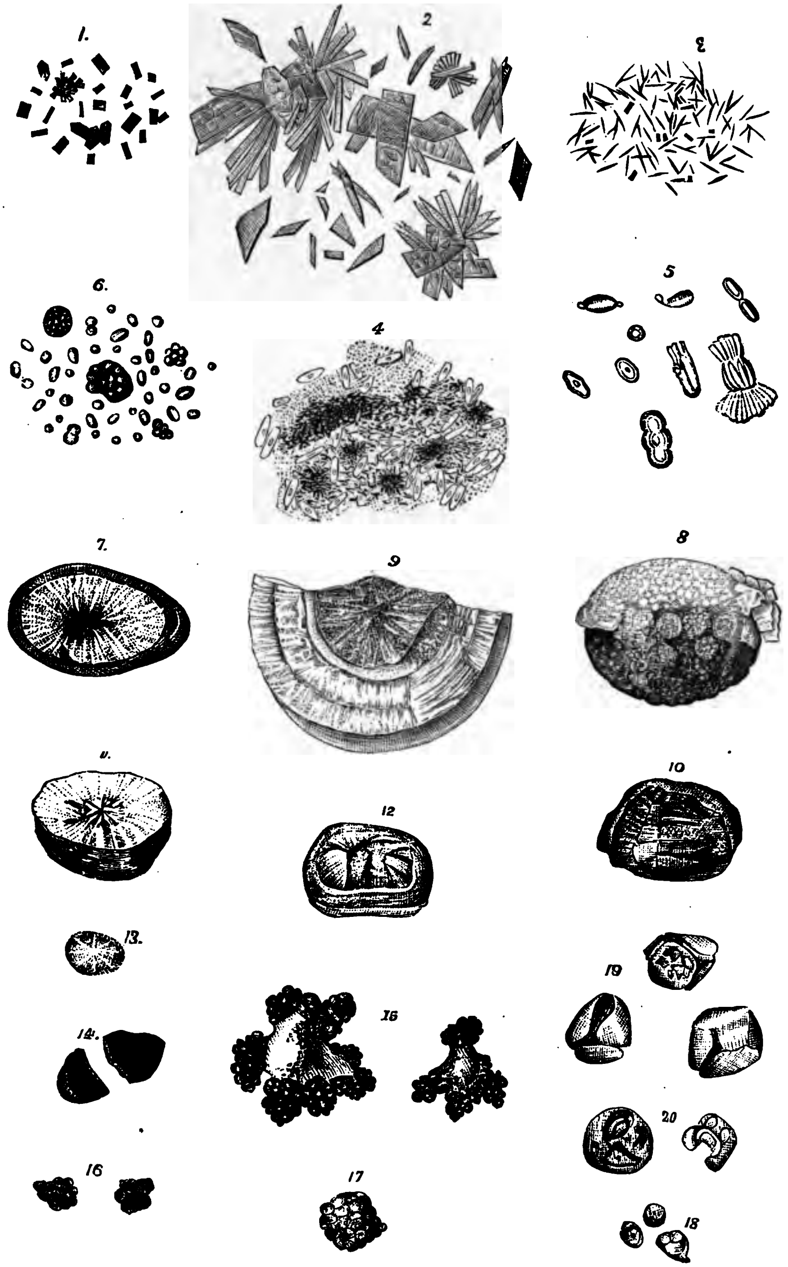

FRERICHS ON DISEASES OF THE LIVER.

A

CLINICAL TREATISE

ON

Robt M. Fuller, M.D.
N.Y. City.

DISEASES OF THE LIVER.

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BY

DR. FRIED. THEOD. FRERICHS,

PROFESSOR OF CLINICAL MEDICINE IN THE UNIVERSITY OF BERLIN, ETC.;
MEDICAL PRIVY-COUNSELLOR AND MEDICAL ADVISER TO THE MINISTRY OF PUBLIC INSTRUCTION
AND MEDICINE AT BERLIN.

IN THREE VOLUMES.

VOL. III.

TRANSLATED BY

CHARLES MURCHISON, M.D., F.R.C.P.,

PHYSICIAN TO THE LONDON FEVER HOSPITAL, LECTURER ON PATHOLOGICAL ANATOMY, AND
ASSISTANT-PHYSICIAN AT THE MIDDLESEX HOSPITAL.

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EXPLANATION OF FRONTISPIECE.

BILIARY CONCRETIONS.

Figs. 1, 2, 3. Bile-pigment crystallized from chloroform. Fig. 1. Prisms. Fig. 2. Laminæ. Fig. 3. Needles.

Fig. 4. Brown pigment of bile crystallized in needles, mixed with the epithelium of the gall-bladder.

Fig. 5. Various crystalline forms of carbonate of lime from the mucous membrane of the gall-bladder.

Fig. 6. Pearl-like gall-stones.

Fig. 7. Gall-stone composed of cholesterine with a radiated structure and a calcareous shell.

Fig. 8. Crystalline gall-stone composed of cholesterine, and covered with crystals of carbonate of lime.

Fig. 9. Large concretion with a radiated nucleus of cholesterine, and a laminated shell, composed of pigment in combination with lime. This calculus caused death by obstructing the small intestine.

Fig. 10. Gall-stone composed of pure cholesterine, with a crystalline laminated structure.

Fig. 11. Radiated cut-surface of the same calculus, with a nucleus containing brown pigment.

Fig. 12. Calculus composed of cholesterine, with a cleft nucleus, radiated structure and a crust consisting of several layers.

Fig. 13. Radiated calculus of pure cholesterine, without any nucleus.

Fig. 14. Brown, flattened calculus with an amorphous appearance on section.

Fig. 15. Angular, white calculus of cholesterine, with deposits of black pigment on the corners and edges.

Fig. 16. Mulberry-shaped calculus of black pigment.

Fig. 17. Reddish-brown mulberry-shaped calculus, composed of crystals arranged in a radiated manner.

Fig. 18. White mulberry-shaped calculus, with a nucleus containing pigment.

Fig. 19. Polyhedral calculus of cholesterine with eroded angles and edges.

Fig. 20. Polyhedral greenish-brown calculus, with deep erosion and exposure of the subjacent reddish-brown layers. The two last figures illustrate the disintegration of gall-stones within the gall-bladder.

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A CLINICAL TREATISE

ON

DISEASES OF THE LIVER.

CHAPTER I.

PATHOLOGICAL NEW-FORMATIONS IN THE LIVER.—HEPATIC TUMORS.

Some of the pathological new-formations met with in the liver are but of slight importance in medical practice, inasmuch as they are attended by scarcely any constitutional symptoms, or impairment of the functions of the gland, and because their diagnosis is impossible. To this class belong the cavernous tumors (*die cavernösen Geschwülste*), tubercles, &c. Others again, such as hydatid cysts and carcinomatous tumors, which not only give rise to numerous local and general derangements, but are likewise dangerous to life, constitute important objects of medical diagnosis and treatment. We shall only briefly allude to the former, in order to give a complete summary of the pathological processes which go on in the liver; but the latter will require a full investigation at our hands.

I. The Cavernous Tumor of the Liver.[1]

(*Die cavernöse Geschwulst der Leber.*)

Bluish-red, or blackish spaces are occasionally found on the surface of the liver, varying in size from a lentil to a hazel-nut or walnut, or, in rare cases, even larger, covered by a whitish, opaque capsule, and lying somewhat below the level of the surrounding parts.[2] On section, there is observed a wedge-shaped or globular tumor penetrating into the substance of the gland, and resembling at many places the corpora cavernosa of the penis. Whitish trabeculæ, some of which are narrow, and others broad, permeate the tumor, and enclose hollow spaces of greater or less size, which are filled with recently-coagulated blood, or, in rare cases, with fluid blood or old coagula. The form and size of the meshes vary greatly. In some tumors the areolar matrix is dense, and encloses small, tolerably uniform, circumscribed, hollow spaces, of a rounded or leaf-like form; in others again, there is no such uniformity, but we find in the same tumor both spongy and dense portions, the former composed of large, irregular meshes, and the latter of small rounded meshes. The tumor is frequently observed to contain islets of hepatic tissue, the secreting cells of which are loaded with pigment or fat, or masses of connective tissue, presenting a peculiar form, which reminds one of the ramifications of blood-vessels. The tumors are separated from the surrounding parenchyma of the liver by a capsule of connective tissue, which at some places is broad, or even includes the remains of hepatic cells; but at other places, is so narrow, that the cavernous structure is almost directly bordered by the glandular tissue, which is sometimes normal, and at others, in a state of fatty degeneration. The trabecular network is everywhere connected with the external capsule. In addition to the large tumors, smaller ones are not unfrequently observed, which consist merely of small hollow spaces, filled with blood, and enveloped in a sheath of fibrous tissue. Sometimes the tumor is in close proximity to the branches of the hepatic veins, without, however, directly communicating with these vessels.

---

[1] Although the cavernous tumors of the liver were recognized and described by Dupuytren and Cruveilhier (*Essai sur l'Anatomie Pathologique*, Tom. II., p. 131), and likewise by Meckel, it is only in recent times that they have been carefully examined by Rokitansky (*Path. Anat.*, Bd. I., and *Sitzungsbericht der Wiener Akademie, mathematisch-naturwissenschaftl. Classe.* Bd. VIII. s. 391), and Virchow (*Archiv f. Pathol. Anat.*, Bd. III., s. 446, and Bd. VI., s. 525).

[2] See Frontispiece, Fig. 7.

As regards the more intimate structure of the cavernous tumors, the trabeculæ consist of a fibrous matrix, which presents the characters of crude connective tissue, and the surface of which, next the hollow spaces, is covered with pavement epithelium. Unstriped muscular fibres have been repeatedly detected in it.[1] At some places near the enveloping capsule, the connective tissue appears to have a fibrous character.

At the periphery of the tumor, the connective tissue penetrates, to a greater or less extent, into the adjoining glandular substance; lying between the fibrous bands, the remains of the hepatic cells may be observed, which are sometimes loaded with pigment, but much more frequently with fat, while the fibrous matrix itself may be seen to contain, either single, or small groups of, hollow spaces, filled with dark blood. Hence, it would seem that the peripheral growth of the tumor consists in an increase of the interstitial connective tissue of the liver, followed by atrophy and destruction of the hepatic cells, and the development of cavernous vascular spaces in the substance of the connective tissue.[2]

A removal of the glandular tissue, with flattening of the lobules, such as is seen in the case of echinococci, is not observed in the circumference of the cancerous tumor, where the parts undergoing disintegration present the same appearances, as in the case of cancer.

A very interesting question is, the relation in which the cavernous spaces stand to the vessels existing in the liver—the portal vein, the hepatic veins and the hepatic artery?[3] This is a point which cannot be determined by simple inspection. It is true, that we usually find large venous branches in the neighborhood of the tumor; but I have failed in discovering any transition between these vessels and the hollow spaces. More important results may be obtained from injection. When injection is thrown into the portal vein, it passes through the small branches of this vessel into the hollow spaces, which become filled up as far as the coagula of blood will permit. The communication just mentioned may always be demonstrated. The relations of the hollow spaces to the hepatic artery are of a different nature. I have failed in discovering any direct communication between the tumor and this vessel, such as is assumed by Virchow. The material thrown into the hepatic artery does indeed penetrate into the tumor, and impart to this its color; but, on examining fine sections, it is found that it does not enter the hollow spaces, but merely passes into the vessels of the trabeculæ, and into the vasa vasorum of the adjoining hepatic veins.

---

[1] I have examined with the microscope numerous sections of cavernous tumors, without finding the club-shaped spaces (*Hohlkolben*, Rokitansky) described by Rokitansky.

[2] This is the view already enunciated by Virchow (*Archiv*, Bd. VI., s. 535), and which is confirmed by my own preparations.

[3] The question has been answered in various ways. Rokitansky compares the cavernous hollow spaces to the alveoli of cancer, and is of opinion that they are first filled

The cavernous tumors are found in every portion of the liver; but are most common upon its upper surface, and especially on the convex surface of the right lobe, near the suspensory ligament, at one time near the anterior margin, at another, posteriorly, and sometimes close to the hepatic veins. They are of more frequent occurrence in the liver than in any other part of the body, and are chiefly met with in persons of advanced life. Virchow observed them much more frequently at Wurzburg than at Berlin; according to Huss they are very rarely seen in Sweden. At Kiel, I only observed one instance of the lesion, whilst at Breslau I have met with it repeatedly.

The pathological and clinical importance of the cavernous tumor is very slight. I know of no case in which it has given rise either to local or general derangements.

II. TUBERCULOSIS OF THE LIVER.

Tubercules are of rare occurrence in the liver, and are scarcely ever met with except where there is advanced tubercular disease of other organs, such as the lungs, the lymphatic glands, the spleen, the peritoneum, &c., or in acute general tuberculosis. In children, they are observed more frequently than in adults. Tubercle existed in the liver, only twice out of the autopsies of 120 phthisical patients made by Louis; while on the other hand, Barthez and Rilliet (*Maladies des Enfants*, Tom. III., p. 847) found tubercles in the liver in 71 of 312 tubercular children; and Willigk (*Prager Vierteljahrsschrift*, 1853, Bd. II., s. 2) out of 476 autopsies, of both adults and children affected with tubercle, ascertained that the liver was involved 19 times.

Tubercular deposits in the liver at one time assume the form of gray, transparent granules, the size of millet-seeds, and at another, that of yellowish nodules, varying in size from a lentil to a pea. They may be distributed more or less uniformly throughout the entire glandular parenchy-

---

with blood, which is newly-developed in them, and that it is not until a later stage that they become connected by fine venous twigs, with the already existing vascular apparatus of the liver. Esmarch has described cavernous tumors of the skin, which are situated at the sides of the larger veins, and communicate with them by cribriform openings. Virchow succeeded in injecting the hollow spaces from the portal vein, as well as from the hepatic artery, and drew the conclusion that they were connected by fine twigs with both these vessels.

ma of the organ, but most frequently they are situated beneath the capsule. Softening of these tubercles, terminating in the formation of small vomicæ, very rarely occurs, and is never so extensive as to give rise to local or general derangements, like those which result from pulmonary phthisis. In most cases, all that we find are a few small, circumscribed cavities, filled with purulent fluid slightly tinged with bile.[1]

These small vomicæ must be distinguished from the cysts which are produced by tubercular disease of the bile-ducts. In this case, as has already been observed by Rokitansky, Barrier, Barthez and Rilliet, masses of tubercle are deposited around the fine bile ducts, the channels of which become gradually more and more narrowed. A small yellow opening may then be observed in the centre of the tubercular nodule; this is dilated, when softening sets in, into a large, hollow space, filled with turbid, bilious fluid, the walls of which become gradually more attenuated, the further the softening advances.

There is no symptom during life indicative of tuberculosis of the liver; its presence cannot be recognized; and hence, it does not constitute an object of treatment. Rilliet and Barthez mention a case recorded by Tonnelé, where its existence had led to the diagnosis of cirrhotic contraction of the liver; but, in my opinion, the symptoms in this case were those of interstitial hepatitis, of which the tuberculosis was nothing more than an accidental complication.

III. LYMPHATIC NEW-FORMATIONS.

(*Lymphatische Neubildungen.*)

The appearance of the so-called lymphatic new formations is not unlike that of tubercles; their pathological relations, however, are essentially different. They are found in the livers of persons who have suffered from leukæmia, particularly when the gland is hypertrophied, or in a state of waxy degeneration.[2] Rounded, or rarely, elongated nodules, about the size of millet-seeds, and of a grayish-white color, are scattered through the parenchyma of the liver. They are made up of densely aggregated nuclei, and of small, slightly granular, rounded cells, between which, especially at the periphery of the mass, a delicate fibrous tissue may be observed. These nodules are connected with the small blood-vessels, in the walls of which they are developed, and the channel of which is thereby narrowed, and occasionally blocked up. Smaller new-formations of this nature may likewise be found between the hepatic cells, where they are developed in the connective tissue of the gland, and compress the cells, assuming at one time a rounded, and at another, an elongated form. In rare cases, we find tumors belonging to this class, the size of peas, and of a medullary consistence, accompanied by similar formations in the pleura, and likewise in the stomach and intestinal canal. (Friedreich.) The development of these new-formations is, to all appearances, intimately connected with leukæmia. Small deposits of the same nature, scarcely visible to the naked eye, were observed by Friedreich and Wagner in typhus and allied conditions. (*Archiv f. Heilkunde*, 1860, s. 322.)

---

[1] Wedl (*Grundzüge der Pathol. Histologie*, 1854, s. 382) found nuclei and the remains of hepatic cells loaded with pigment in the softened portions. He frequently observed the tubercles colored yellow in the centre.

[2] Virchow (*Archiv f. Pathol. Anat.*, Bd. I., s. 569, and Bd. V., s. 125); Friedreich (*ibid.*, Bd. XII., s. 37); Böttcher (*ibid.*, Bd. XIV., s. 483).

IV. Simple Cysts of the Liver.

Simple serous cysts, with clear watery contents, are not of frequent occurrence in the liver. I have repeatedly, however, observed isolated cysts in the organ, varying in size from a pea to a bean. Their inner wall is covered with pavement epithelium, and presents membranous projections, such as result when small cysts unite to form larger ones (Fig. 1). Sometimes these cysts are developed in large numbers, and are accompanied by similar disease of the kidneys. Bristowe (*Transactions of the Pathological Society of London*, Vol. VII., p. 229) found the liver in one case enlarged and covered with cysts, which were likewise scattered through the interior of the organ. Their walls were white and presented prominent folds; their inner surface was lined by a layer of flattened cells; and they were filled with a colorless serum. No connection could be made out between them and the bile-ducts. On injecting the bile-ducts, the injected material penetrated into the cysts at a few places only, owing to some rupture having taken place. Some of the cysts were situated in the centre of the lobules. Beale was of opinion that the cysts originated in an alteration of the hepatic cells. The kidneys likewise contained numberless cysts, some of which were as large as a hen's egg. The patient had complained during life of pains in the epigastrium and right hypochondrium, and had passed bloody urine.[1]

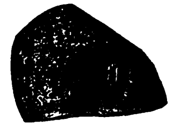
Fig. 1.—Portion of liver cut across and disclosing a simple serous cyst, with two membranous projections from its inner wall.

Older preparations of a similar nature, showing the coexistence of cysts in the liver and in the kidneys, are, according to Dr. Wilks, to be found in the Museum of Guy's Hospital. In these cases, also, the bile-ducts were uninvolved. (*Trans. Path. Soc.*, Vol. VII., p. 235.)

I have observed similar morbid changes in the liver and kidneys of a female, aged 65, who from the 16th to the 19th of July, 1854, had been a patient in the medical Clinique at Breslau, for pneumonia of the upper lobe of the right lung and pericarditis. At the *post-mortem* examination, in addition to the exudation in the lungs and the pericardial effusion, the liver was divided by a deep tight-lace fissure, and, the portion of the organ in the neighborhood of the suspensory ligament, was found to contain numerous cysts, from the size of a pea to that of a bean, with clear, watery contents. Similar cysts were observed in greater numbers in the cortical substance of the left kidney, which was likewise covered with numerous cicatrix-like depressions. There were no cysts in the right kidney.

Friedreich (*Archiv f. Path. Anat.*, Bd. XI., s. 166), when examining an atrophied pigment-liver, found a cyst the size of a hazel-nut, containing inspissated mucus, and lined with glistening epithelium. This variety of cyst, however, must be regarded as a partial obliteration of one of the bile-ducts, which has been subsequently shut off from the rest of the duct. (See under the head of Diseases of the Bile-ducts.)

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[1] Another similar case has been recorded by Dr. Bristowe, in the "Pathological Society's Transactions," Vol. X., p. 174.—Transl.

V. Hydatids.—Echinococci of the Liver.

1. *Historical Account.*

The ancient physicians were familiar with large cysts of the liver filled with water, although they were ignorant of their real nature. Thus we find in Hippocrates (*Aphorism.*, Sect. VII., p. 55):[1] Galen (*Commentar. in Aphorismos*, Lib. VII.): and Aretæus (*De Causis et Notis Diuturn. Affect.*, Lib. II.): passages, which admit of no other interpretation. No accurate descriptions of these cysts, however, were recorded, until after a greater degree of attention had been bestowed upon anatomy in the sixteenth and seventeenth centuries. Felix Plater, Vega, Riverius[2] and others recorded careful observations of the disease in question, and already in the "Sepulchretum" of Bonetus (Lib. III., Sect. XXI.), we find a collection of several well-described cases.[3]

Notwithstanding the rapidly increasing number of observations, the peculiar nature of the hydatids for a long time remained unknown. They were presumed to be enlargements of the lymphatic vessels, and to originate in various others ways, until Pallas, in the year 1760 (*De infestivis viventibus intra viventia, Dissertatio Inauguralis*, and likewise in *Miscellan. Zoolog.*), recognized them as independent parasites, and showed their close relation to tapeworms:[4] a discovery which was confirmed and extended by Goeze. The first accurate description of a human echinococcus was published in the year 1821 by Bremser.

It has been reserved for the present time, to trace still farther the relations of the hydatids to the tapeworms, and to shed a new light upon the etiology of these formations. The opinion has been gradually arrived at,[5] that the echinococcus is merely a stage in the development of a tapeworm, its progeny in fact, which immigrates in the embryo form which grows as an echinococcus, and which only reaches the tapeworm stage of development after entering the intestinal canal of an animal. At the same time, clinical observations, as regards the effects of the echinococci upon the liver, their symptoms, progress, modes of termination and treatment, have been rapidly accumulating. A tolerably complete collection of the existing clinical materials is given by C. Davaine, in his excellent work, "Traité des Entozoaires et des maladies vermineuses de l'homme et des animaux domestiques." (Paris, 1860, chez J. B. Baillière et Fils.)

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[1] Quibus hepar aquâ plenum in omentum erupit, his venter aqua repletur et moriuntur.

[2] Riverius (*Boneti Sepulchret*, Lib. III., sect. 21, p. 1105) described a case of cure in the following terms:—"Rusticus quidam hydropicus factus abscessum passus est in dextra parte abdominis; eoque aperto, infinitus propemodum vesicularum aqua repletarum numerus egressus est, ut ducentarum numerum excederet, idque per plurum dierum spatium; et sic omnino curatus est."

[3] A case of suppuration, and opening of the abscess externally at the lower end of the sternum, observed by Camerarius, is to be found in Bonetus (*loc. cit.*, p. 1532). A quantity of pus, and about 300 bladders escaped from the opening of the abscess during life, and the autopsy subsequently disclosed—"Hepar grandius solito et colore livido; in superiore parte, versus diaphragma, abscessus sese in eo obtulit plenus vesicis et materia putrida, circumdatus quasi cartilaginosa membrana."

[4] The earlier discoveries of Redi, Hartmann and Tyson, as regards the animal nature of the cysticerci, had again been forgotten.

[5] Von Siebold (*Zeitschrift f. wissensch. Zoologie*, 1853-4, s. 409); Küchenmeister (*Prager Vierteljahrsschrift*, 1852; *Parasiten*, 1855); Van Beneden (*Zoologie médic.*, T. II., p. 216); Leuckart (*Die Blasenbandwürmer und ihre Entwickelung*, *Giessen*, 1856).

2. *Anatomical Description of the Hydatids and Echinococci.*[1]

In most cases, only a single hydatid is developed in the liver; but occasionally, two, three, or more, are found in the same organ. The hydatid consists externally of a firm, fibrous capsule, of a white or yellowish-tint, intimately adherent to the surrounding glandular tissue, and abundantly supplied with arborescent branches of the hepatic artery and vena portæ. Within this capsule, and completely filling it, is a gelatinous translucent, gray bladder, composed of numerous concentric, hyaline, layers—the so-called mother-sac (*Mutterblase*) of the echinococcus, that is to say, the embryo, which has increased in size to a remarkable extent.[2] This sac contains a clear, watery fluid with numerous large and small vesicles floating loosely in it, some of which, and particularly the smallest, are adherent to the wall of the mother-sac. Their size varies from a millet-seed to that of a goose-egg; their number not unfrequently amounts to several hundreds or even thousands.[3] The larger vesicles sometimes contain smaller ones of a third generation, and occasionally the latter, in their turn, contain others of a fourth generation. It can readily be understood how the size of the mother-sac must increase, according to the number and size of the daughter-vesicles (*Tochterblasen*), and in proportion to the quantity of contained fluid; sometimes it attains to the size of a man's head or upwards. The growth of the mother-sac may go on until it ruptures, and then only a few shreds of it may be found lying among the daughter-cells. On closer examination, a number of delicate white particles may be observed upon the inner surface of the sac, which are usually aggregated in groups, and may be seen from without through the thin walls of the cyst; they are also present in the fluid, which is rendered slightly opaque by them. These are the scolices of the tænia echinococcus, in various stages of development. The animal is from $\frac{1}{20}$ to $\frac{1}{6}$ of a line in length, has a head similar to that of the tænia, furnished with four suckers and a proboscis, encircled by a doubled festoon of hooks, the number of which, according to Küchenmeister, amounts to from 28 to 36, or from 46 to 52. The head of the worm is separated from its body by a groove, and at its posterior extremity presents an umbilical depression, which gives insertion to a cord, by means of which the animal is attached to the inner surface of the sac. The body presents elongated striæ passing backwards from the head, and likewise transverse lines passing from side to side. In addition, we observe a greater or less number of rounded calcareous corpuscles. The form of the animal varies greatly, according as its head is extended, or retracted. (Fig. 2.)

The form of echinococci just described is not the only one which is met with in the human liver. Other forms are observed, where the mother-sac contains no daughter-vesicles, and the scolices only grow upon the inner surface of the primary sac.

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[1] The author makes no distinction between the terms hydatid and echinococcus, and does not restrict the former to the enveloping cyst and the latter to the contained entozoa, as is done by most English writers.—TRANSL.

[2] According to Huxley, it is only the innermost layer which is to be regarded as the embryo-sac, the external layers being merely a secretion of the entozoon. (See *Med. Times and Gaz.*, Aug. 16th, 1856, p. 158.)

[3] Pemberton (*A Practical Treatise on various Diseases of the Abdominal Viscera*, London, 1814) counted 560 hydatids in one cyst. Ploucquet quotes a case from Allen, where between 7,000 and 8,000 were found.

Moreover, hydatids are met with which contain no scolices at all; here the external capsule is lined by a hyaline mother-sac composed of several layers, in which no scolex can be detected, either on its inner surface or in the clear fluid which it contains. These are the structures described by Lænnec as acephalocysts, the existence of which was for a long time called in question, and which, more recently, have been regarded as sterile echinococci (Küchenmeister) or as an earlier stage of development of this cystic entozoon (Van Beneden, Davaine, Lassègue).

As regards the chemical nature of the echinococci, the substance of the membranes has not yet been sufficiently examined. The notion formerly entertained, that it consisted of some proteine principle, was shown by me to be erroneous several years ago;[1] quite recently, Lücke[2] has rendered it highly probable that the membranes contain chitine, and that they yield grape-sugar, when treated with sulphuric acid. The fluid filling the vesicles is colorless, clear, or slightly opalescent, of low specific gravity,[3] and, in most cases, of neutral, or, not unfrequently, of alkaline or acid reaction. It is non-albuminous, and is not rendered opaque either by heat or nitric acid[4] (Bernard, Lücke). Heintz, and afterwards Bœdeker, detected in it a quantity of succinate of soda,—a compound which Valentin, Recklinghausen, Lücke and myself have failed in discovering with certainty.

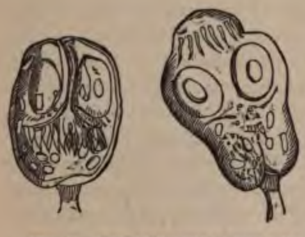

FIG. 2.—Two echinococci from a hydatid cyst: one with the booklets retracted, and the other with them protruded.

3. *Relation of the Echinococci to the Hepatic Parenchyma.*

Hydatids are formed in all parts of the liver, in the right as well as in the left lobe, on the upper as well as on the under surface, buried in the substance of the gland as well as projecting from its surface or margins. In most cases, there is but one cyst present; but not unfrequently two or three, or, in exceptional cases, five or six exist in the same organ. Growths of the same nature are developed at the same time in other parts of the body, but more especially in the thoracic cavity.

The alterations of form presented by the liver under such circumstances are as various as the directions in which the cysts develop themselves. The size of the gland may increase to such an extent that the greater portion of the abdominal cavity and the right side of the thorax are filled by the tumor. The more the cysts grow, the more is the glandular tissue compressed and atrophied. The remaining portion of the gland in most cases retains its normal appearance, or is compressed and thickened,[5] and occasionally it presents the characters of true hypertrophy, the lobules being enlarged and prominent, without any foreign elements being discoverable on careful examination.

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[1] Wiegmann's *Archiv*, 1848. Bd. I., s. 24.

[2] *Archiv f. Pathol. Anat.* Bd. XIX., s. 189.

[3] I have found the specific gravity to be 1009; Bœdeker found it 1010, and Von Recklinghausen, 1015. The quantity of solid constituents was determined by myself to be 1·41 per cent.; by Bœdeker, to be 1·6 per cent.; and by Von Recklinghausen, to be 2 per cent. They consist chiefly of inorganic matters, and especially of common salt.

[4] Albumen is found in greater or less quantity when the sac becomes inflamed after tapping, or from any other cause.

[5] Leroux has described a case, where the entire right lobe of the liver was converted into a large sac, with thick walls composed of the compressed glandular tissue. No blood-vessels or bile-ducts could be detected in it.

In rare cases, it happens that the most superficial portion of the cyst becomes inflamed and suppurates, in consequence of external violence, or without any obvious cause, or perhaps as the result of the rapid growth of the echinococci. In the body of a pugilist, who had sustained a blow from the fist over the liver, Budd (*op. cit.*, p. 96 and p. 437) found a number of abscesses, varying in size from a pea to a nut, in the vicinity of the sac of a hydatid, which had been ruptured, and was filled with coagula of blood. Budd believed that this inflammation was due to the contact of the liquid of the hydatid with the hepatic tissue. Puncture of the cysts is sometimes followed by similar results. Ordelin (*Med. Zeit. d. Vereins für Heilk. in Preussen*, 1857, No. 43) found a number of large and small abscesses surrounding an extensive hydatid cyst, which had been developed independently of any external cause.

The larger blood-vessels and bile-ducts are comparatively seldom affected by the echinococci. Jaundice and ascites, as a rule, do not come under the symptoms of hydatids. Still, there are exceptional cases where the bile-ducts, as well as the blood-vessels, suffer in various ways from the effects of the cysts.

In the first place, the bile-ducts may be obliterated. In one case, Leroux was unable to discover any trace of the hepatic or cystic duct, or of the ductus choledochus. Cadet de Gassicourt and many others have recorded cases where the ductus choledochus was obliterated.

Communications are sometimes observed between the bile-ducts and hydatid cysts, owing to the latter, in the course of their growth, destroying the walls of the hepatic ducts in their vicinity, in the same way as they may force a passage into the bronchi, the intestinal canal and the large blood-vessels.[1] Thus it is, that we not unfrequently find a number of bile-ducts communicating freely with the interior of the cysts, the contents of which become mixed with bile, with consequent death of the echinococci. Cruveilhier, Rokitansky, Budd and others have justly observed, that the entrance of bile into the hydatid impedes its further growth; in most cases of hydatids, which were undergoing retrograde metamorphosis and shrivelling, I have found the sac to contain bile. Sometimes it happens that the vesicles escape from the interior of the sac into the bile-ducts, and become impacted there, causing dilatation of the ducts, and ultimately passing into the gall-bladder or the bowel. Occasionally, all the hydatids may be removed through the bowels, and the cysts, in consequence, may be cured. Charcellay (*Bulletin de la Société Anat.* 1836, p. 317) has recorded a case of echinococcus of the liver, which communicated freely with the bile-ducts and the hepatic veins. The veins were filled with pus; a compressed and flattened vesicle, two-and-a-half inches in length, lay in the lower part of the ductus choledochus, and another was impacted in the opening of a bile-duct in the wall of the cyst. Charcot (*Compt. Rend. de la Société Biologique*, 1854, 2^{me} Série, Tom. I., p. 99) met with a case, in which the ductus choledochus was completely blocked up by hydatids; the cyst from which they were derived was empty, but in consequence of the obstruction, the gall-bladder had ruptured, and fatal peritonitis was the result. Here, a cure of the hydatids would have taken place by evacuation of the cysts through the bile-ducts, had not the closure of the ductus choledochus led to the fatal catastrophe. Cadet de Gassicourt (*Bulletin de la Société Anat.*, 1855, p. 214) met with a case where the sac of an echinococcus communicated at two places with the ductus choledochus. Moreover, Leroux, Bowman, Budd and others have several times observed hydatids communicating with the gall-bladder, and emptying their contents into it. Here, likewise, a cure is possible from the cysts forcing their way into the intestine, in a similar manner to what takes place in the case of gall-stones. Lastly, Rœderer and Wagler (*Tractatus de Morbo Mucoso*, Sectio IV.) have recorded an instance where an hydatid cyst contained a round worm, which had crept into it through a bile-duct.

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[1] Some authors have expressed doubts as to this mode of communication, and have supposed that the echinococci have been originally developed in the interior of the bile-ducts. This view, however, appears improbable, from the circumstance, that hydatids are never observed in canals lined by a mucous membrane, in other parts of the body.

The blood-vessels of the liver, and more particularly the hepatic veins, may, like the bile-ducts, ultimately communicate with the echinococcus cysts. Dolbeau (*Bulletin de la Soc. Anat.*, 1857, p. 116) found about forty hydatid cysts in a very large liver, several of which were filled with blood; the material injected into the vena portæ and the hepatic artery passed into these last-mentioned cysts. When the branches of the hepatic veins are laid open, phlebitis ensues in most cases, and may give rise to metastatic deposits in the lungs, together with the general symptoms of pyæmia. Charcellay records a case where the hepatic veins communicated with the sac of an echinococcus, and were filled with pus. Bowman's observation, which is communicated by Budd (*op. cit.*, p. 444), is another instance of the same occurrence. Here the liver contained several hydatids, one of which communicated with the bile-ducts and with the gall-bladder; the purulent contents of another had passed into a contiguous hepatic vein, by an opening large enough to admit a writing quill; the lower lobe of the left lung contained small deposits of pus.

We shall discuss the opening of the echinococcus sacs into the inferior vena cava, under another section.

4. *The Changes effected upon the Echinococci by long duration.*

As the growth of the hydatid advances, the external enveloping capsule gradually loses its uniform, thin and smooth character. By degrees it attains a thickness of several lines, and acquires a rigid, fibrous, or cartilaginous consistence, while its inner surface becomes rough and uneven, covered here and there with laminated deposits. As the cyst meets with unequal resistance from the surrounding parts in the course of its growth, pouch-like depressions and diverticula are developed, which detract more or less from the regularity of its globular form. Not unfrequently, the capsule ultimately undergoes partial or complete ossification.[1] The thicker and more rigid the capsule becomes, the greater is the resistance opposed to the further growth of the echinococci, and in many cases their growth is arrested, and the hydatids die, because the obstruction can no longer be overcome. As Cruveilhier has justly pointed out (*Anat. Pathol. Générale*, Tom. III., p. 550), this is one cause of destruction of the echinococci and of a spontaneous cure. Under such circumstances, the capsule is found reduced in size from the effects of cicatrix-like contraction, while the hydatids in its interior are flattened, wrinkled, and dried up, but free from the admixture of any foreign matter.

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[1] I have seen a cyst, the size of a goose-egg, completely surrounded by a calcareous shell, from two to three lines in thickness.

In other cases, there is developed between the capsule and the mother-vesicle, a grayish-white, tubercular-looking mass, which at one time is semifluid and tenacious, at another thick and like putty, and sometimes, liquid and puriform. This material consists of oily globules and granules, together with a few isolated crystals of cholesterine. The fluid in the interior of the cysts at first continues clear, but after a time it becomes milky and opaque, while the vesicles themselves are flattened. At a later stage, we can only discover shred-like remains of the vesicles, until ultimately even these disappear, and the circles of hooks are all the remains of the hydatids that can be discovered in the thick gray paste, forming the mass of debris. Very commonly, we find hæmatoïdine in this mass, in a crystalline or amorphous form, and likewise bile, which has flowed in from the patent hepatic ducts, and which not unfrequently has been the original cause of the death and retrograde metamorphosis of the hydatids.[1]

In a large proportion of cases, the echinococci of the liver are destroyed in the manner just described, and become in consequence harmless.

When the growth of the hydatid is not interrupted, large tumors are formed, which, independently of their injurious effects upon the glandular tissue, interfere with the functions of the adjoining organs, by their great size, and may also ultimately burst and evacuate themselves in various directions.

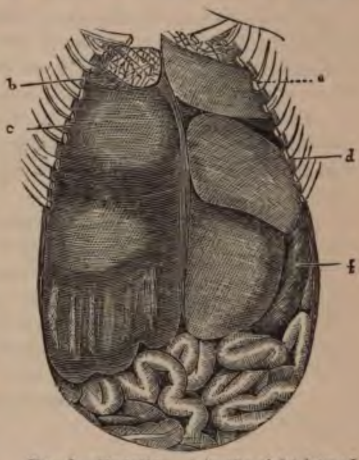

FIG. 3.—Hydatid cyst in the right lobe of liver compressing the right lung and pushing the heart upwards and to the left: *b*, middle lobe of right lung; *c*, large hydatid cyst; *d*, enlarged spleen lying on upper surface of left lobe of liver; *e*, heart; *f*, stomach.

Most frequently, the sac of the echinococcus grows upwards into the right side of the chest, or pushes upwards the diaphragm, which offers less resistance than the muscular wall of the abdomen, compresses the right lung, and pushes the heart upwards and to the left. Under such circumstances, the diaphragm is elevated as high as the second rib, or even to the clavicle. A case has already been recorded in the first volume (Observation I., p. 40), where the diaphragm reached as high as the level of the second rib (Fig. 3); above it was seen the middle lobe of the right lung compressed into a bluish-gray membrane, destitute of air (*b*); the heart (*e*) had assumed a transverse position, its apex lying in the third left intercostal space; the diaphragm, on the left side, was raised to the level of the fourth rib, and was pushed up at this place by the enlarged spleen (*d*), lying above the left lobe of the liver. Below the diaphragm, the liver was observed with a cyst, which measured 9¾ inches perpendicularly, in its right lobe. Death had taken place by asphyxia. Similar cases have been recorded by Gooch (*Cases and Remarks on Surgery*, p. 170), and Dolbeau (*Étude sur les grands Cystes de la surface convexe du Foie. Thèse.* Paris, 1856). The former of these writers met with a case, where the liver reached as high as the clavicle, and where it was no longer possible to inflate the compressed right lung.

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[1] The earlier physicians, such as De Haen and Ruysch, were long ago acquainted with this metamorphosis of hydatids, and described the resulting debris under the appellations "Atheroma" and "Meliceris." Ruysch (*Observat. Anat.*, Tom. XXV., p. 25) observes: "Hydatides in atheromata, steatomata et melicerides mutari nulla mihi ambigendi relinquitur ansa; plures enim istius modi offendi hydatides, in quibus aliquando materiem pulti, lacti, sero, coagulo caseoque æmulam reperi."

When the sac of the echinococcus grows from the under surface of the liver in the direction of the abdominal cavity, it pushes downwards the stomach, colon and small intestine, not unfrequently as far as the brim of the pelvis, the mechanical injuries of these organs giving rise to manifold functional derangements. More rarely the tumor compresses the vena cava, and produces derangements of the corresponding portion of the venous system, anasarca, varices, &c. Habershon has described a case of this sort in the *Guy's Hospital Reports* (3d Ser., Vol. VI., p. 182).

The bursting of the echinococci into the adjoining cavities and organs is of much more importance than this compression of the parts in their vicinity, inasmuch as such an occurrence may bring about a spontaneous cure, or, on the other hand, may lead to a rapidly fatal termination.

The direction in which the perforation takes place varies greatly. Davaine has collected the cases, scattered through the records of medicine, and has arrived at the following results:—

Echinococci bulging into the thorax...............	4	cases.
" opening into the pleural cavity........	9	"
" opening into the base of the lung, or into the bronchi..................	21	"
" communicating with the bile-ducts......	8(?)	"
" bursting into the abdominal cavity......	8	"
" bursting into the stomach or intestine...	22	"
" not extending beyond the liver.........	94	"
Total..............	166	"

These numbers, however, afford no reliable data as to the comparative frequency of the different modes of termination of hydatids of the liver, inasmuch as they only include those cases which have presented some peculiar pathological or therapeutic interest; moreover, the simple cases are less frequently discovered. Hence the last estimate, referring to the cysts, which run their course within the liver, is much too small. Of 23 cases which have come under my own observation:—

3 extended into the right side of the chest.
1 broke into the base of the lung, and there gave rise to an extensive abscess.
1 opened into the bronchi.
1 opened into the intestinal canal.
2 burst into the abdominal cavity.
1 opened externally through the umbilicus.
14 remained confined to the liver. Of these, 11 had been the source of no symptoms whatever during life; in 9 the echinococci were dead and were undergoing fatty degeneration, and most of them contained an admixture of bile or hæmatoidine; one was calcified.

The perforation into the cavity of the chest is of most frequent occurrence. When the contents of the cyst are poured into the sac of the pleura, or, in exceptional cases, into the pericardium, a very acute attack of pleurisy or pericarditis is developed, which terminates almost invariably in death. When the base of the right lung is adherent to the diaphragm, the echinococcus excavates a large cavity in its lower lobe, which may remain closed, or may ultimately communicate with one of the bronchi. In the last case, the contents of the cyst are expectorated, and entire vesicles or shreds of them are found in the sputa, together with a watery fluid containing sugar, and sometimes also, bile. In this way, a cure may take place, or death from exhaustion may result.

Hydatids of the liver open into the sac of the peritoneum, or into the stomach and intestinal canal, less frequently than into the thoracic cavity. In the former case, the escape of the hydatid vesicles and fluid is immediately followed by violent peritonitis, which invariably terminates fatally. Death usually occurs in a few hours; or more rarely, when the rupture is small and but little of the contents has escaped, at the end of some days.[1] The rupture of the sac is usually caused by external violence, by a blow or push against the hepatic region, by a fall, or by an imprudent strain, &c.; more rarely the rupture is spontaneous. Lassus saw a case, where an hydatid tumor of the liver burst in consequence of a fall from a horse. When at Breslau, I made the *post-mortem* examination of a young lady, in whom an hydatid of the liver had ruptured in consequence of a fall from a flight of stairs. The fatal result ensued within a quarter of an hour after the fall. (See Observation No. I., p. 27.) Roux (*Clinique des Hôpitaux*, Tom II., p. 46) met with an instance where a large tumor in the right hypochondrium of a young female suddenly disappeared after a strain, its disappearance being attended by severe pains, while, at the same time, fluctuation could be discovered in the abdomen. A quantity of clear water and numerous hydatids escaped by an incision, which was made at the lower end of the linea alba, but without averting a fatal termination.

The bursting of the hydatid into the stomach or intestinal canal is attended with much less danger. The opening in most cases remains small and narrow, so that the hydatids are only evacuated slowly, and at long intervals. Usually they are discharged with the stools; more rarely, when the rupture has taken place into the stomach, they are vomited; or they may escape both upwards and downwards simultaneously. When the opening takes place in the manner just indicated, the occurrence usually leads to a cure. Becker (*Hufeland's Journal*, 1811); Clémot (*Gaz. des Hôpitaux*, Tom. VI., p. 31), and Chomel (*ibid.*, Tom. X., p. 597), have recorded cases of this nature which recovered; while fatal cases have been reported by Portal, Cruveilhier and others. I shall subsequently communicate the details of a case, where, after a blow upon the enlarged liver, echinococci were discharged with the stools and dangerous symptoms supervened, and yet the case terminated successfully.

More rarely, hydatids of the liver open externally through the abdominal parietes, or through the lower intercostal spaces. F. Plater (*Observat. Selectæ*, Obs. XVIII.) mentions the case of a female, 20 years of age, who had a large tumor in the right hypochondrium, causing a painful tension of the abdominal parietes. This tumor ultimately burst and discharged clear water, together with hydatids. The patient recovered. Another similar case, which terminated fatally, has been recorded by Camerarius (*Boneti Sepulchretum*, p. 1532).

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[1] Chomel observed a patient, who survived the bursting of the sac of an echinococcus into the abdominal cavity fourteen days.

In the first year of my medical practice, I had under treatment a female, 50 years of age, who for a long time had a fluctuating tumor in the hepatic region, until at last the integuments at the umbilicus became red and burst, discharging a thin, liquid pus, together with a large number of hydatids, some of which were ruptured, while others were entire. The discharge continued for a month, at the termination of which death took place from exhaustion. Fergusson and Budd have reported a case, where a fistulous opening through the skin and abdominal muscles existed for a long time, after the rupture of a cyst through the abdominal parietes.

In exceptional cases, the hydatids open into the vena cava ascendens, and pour thèir contents into the blood; the vesicles then reach the right side of the heart, from which they are propelled into the pulmonary artery, where they remain impacted and induce asphyxia. Professor Luschka has communicated to me an observation of this nature, which is worth mentioning. A female, 45 years of age, had for a long time a tumor in the hepatic region, which in no way affected her general health. One morning, when she was stooping to put on her clothes, she became suddenly collapsed, and in a few minutes was a corpse. At the autopsy, it was discovered that the liver near its rounded margin contained the sac of an echinococcus as large as a child's head, which surrounded the vena cava and was intimately adherent to it. At the lower edge of the fissure of the vena cava, the wall of the hydatid sac was only a line and a-half thick, and here and there was an irregularly notched rupture, three-quarters of an inch in length, opening into the vena cava. Through this opening, the vesicles had passed to the right side of the heart, and into the pulmonary artery, and had completely blocked up the channel of this vessel.

Piorry (*Percussion Mèdiate*, 2^{me} Ed., p. 169) has published a similar observation. The case was that of a female, aged 70; the vena cava, at the place where it adhered to the hydatid sac, was ossified. The patient lost her consciousness, and had convulsive movements of the arms. Soon after, dyspnœa and tracheal râles supervened, which in two or three hours terminated in death.

In a third case, recorded by L'Honneur (*Bulletin de la Sociètè Anatom.*, 1855, 7 *Juillet*), the rupture was preceded for several days by pains in the hepatic region, which were treated as intercostal neuralgia. There was an ulcerated surface on the vena cava, corresponding to the rent in the hydatid, 2 centimètres (⅘ inch) long, and on the inner surface of the vessel were gray, atheromatous patches, 5 centimètres (2 Eng. inches) in diameter. Death followed the rupture almost instantaneously.

5. *Symptoms.*

It frequently happens, that echinococci exist in the liver, grow and degenerate, and are found after death, without having betrayed any symptom whatever of their presence during life. This is always the case, when they are developed deep in the substance of the hepatic tissue, and when their size is not so considerable as to alter essentially the form or dimensions of the gland; under such circumstances, they do not usually give rise to pains, or any functional derangements. I have found an hydatid in the liver, as large as a man's fist, which had occasioned no remarkable symptom, and whose presence had consequently not been recognized during life. Fig. 4 represents a liver with an hydatid projecting from the upper surface of its right lobe, and penetrating deeply into the parenchyma, but without altering the extent or form of the organ in any way capable of assisting diagnosis.

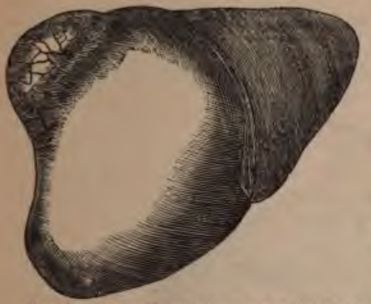

FIG. 4.—Hydatid imbedded in the right lobe of the liver, and projecting from its upper surface, without altering the form or dimensions of the liver.

In most cases, however, local changes take place which indicate beyond a doubt the existence of the hydatid. The liver increases in volume, and projects into the thoracic or the abdominal cavity, or sometimes in both directions, and at the same time loses its ordinary form. Its boundaries, as determined by palpation and percussion, may extend as high as the second rib, and as low down as the pelvis, so that the tumor fills up the greater portion of the right side of the thorax (See Fig. 3, p. 11), or the abdominal cavity also, presses out the ribs and abdominal walls, and produces an obvious bulging of the intercostal spaces. (See Vol. I., p. 41.)

More frequently, a rounded bulging of the liver is felt in the right or left hypochondrium and in the epigastrium; or, on determining the upper boundary of the gland by means of percussion, there is found to be a semi-globular dull space mounting up into the right, or rarely into the left, side of the chest. Fig. 5 represents a liver, which ascended high up into the cavity of the chest, after the development in the upper part of its right lobe of a cyst, that measured upwards of nine inches in its perpendicular diameter. The inferior intercostal spaces were enlarged, while at the same time they bulged outwards and fluctuated, and the costal arch itself was pressed outwards.

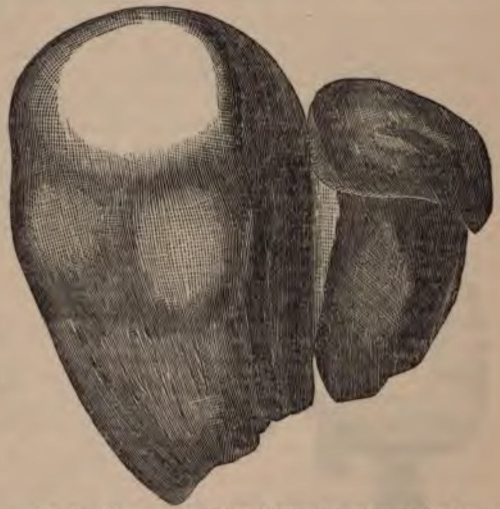

FIG. 5.—Liver much enlarged from the presence of a large hydatid cyst in its right lobe. The left lobe is covered by the spleen. One-fourth of the normal size. See Observation I., Vol. I., p. 40.

Very different from this is the form of liver represented in Fig. 6. Here three cysts, about the size of a man's fist, and pressed together so as to resemble a trefoil leaf, were found projecting from the under surface of the left lobe of the liver, filling up the left hypochondrium and epigastrium, and pushing the spleen to one side.

Of much rarer occurrence are the echinococci which are only attached to the liver by a narrow base, and constitute elongated, prominent, move-able appendages, resembling an enlarged gall-bladder. Such a tumor is represented in Fig. 7, *b;* close to it is the gall-bladder, *c;* and on the left lobe is another small rounded cyst, *a*.

Similar forms are likewise represented under Observation I., Fig. 8, p. 28.

It is impossible to describe all the various modifications of form which echinococci of the liver may assume; a knowledge of these can only be acquired by an extended experience at the *post-mortem* table.

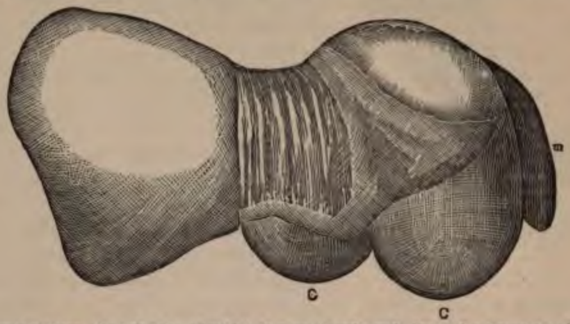

FIG. 6 represents a liver, the left lobe of which is greatly enlarged, from the presence of three large hydatid cysts, projecting from its under surface. Two of these are seen in the figure *c c* ; *m* is the spleen.

On palpation, hydatids are felt as smooth, globular, elastic tumors, which often, but by no means always, impart a distinct feeling of fluctuation. On percussion, they not unfrequently present a peculiar vibration or trembling, which is felt most distinctly when the tumor is gently compressed by two fingers of the left hand, and struck abruptly with the right hand, or when we allow the finger to rest for a moment upon the pleximeter, after percussing.[1] This sign is far from being invariably present; I have failed to discover it in more than half of my observations; I have only found it distinctly developed, when the sac of the echinococcus included a large number of vesicles, and was not very tensely distended. I have never been able to discover it, where there was only one vesicle present, although Jobert has observed it even then.

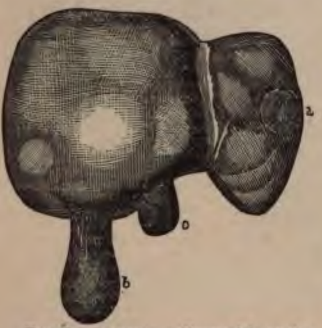

FIG. 7 represents a liver with an hydatid (*b*) attached by an elongated movable pedicle, and resembling an enlarged gall-bladder; *c*, is the gall-bladder, and *a* is another small hydatid cyst projecting from the surface of the left lobe.

Echinococci of the liver are not usually the source of painful sensations; and it is only when they attain a large size, that they give rise to a feeling of fulness and heaviness, or of tension. Actual pains are not experienced, until inflammation is lighted up in the circumference of the sac. Exceptional cases, however, occasionally occur. I have met with a patient who had a large hydatid tumor of the liver, which was the seat of violent pains after every manipulation and movement, so that a diagnosis of cancer of the liver was arrived at. On making a puncture, a clear watery fluid escaped, and the pains ceased almost immediately on the removal of the tension and the restoration of the neighboring parts to their normal situation.

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[1] Briançon (*Essai sur le Diagnostic le Traitement des Acephalocystes. Thèse.* Paris, 1828) and Piorry (*De la Percussion Médiate.* Paris, 1828, p. 158) were the first to point out the diagnostic value of hydatid vibration.

Davaine recommends that three extended fingers be applied firmly over the most prominent part of the tumor, and that percussion be made with the middle one.

Symptoms indicative of impeded excretion of bile, or of obstructed portal circulation, are not of common occurrence in hydatids of the liver. Jaundice and ascites, as well as persistent symptoms of indigestion, are rarely present. On the other hand, while the growth of the tumor increases, a series of symptoms always make their appearance, which are due to the mechanical pressure upon the adjoining organs. These are: dyspnœa, and a short, dry cough, when the echinococcus rises up into the thorax; palpitations, when the heart is dislocated; vomiting and obstructed defæcation, when the stomach and intestines are compressed; œdema of the feet and varicose veins, when the pressure is made upon the vena cava.

The echinococcus of the liver develops itself slowly and insidiously, without fever or any other derangements of the general health. Symptoms of defective nutrition are not usually observed, until the cyst has attained very considerable dimensions, and produces mechanical obstructions in many different directions.

As soon as the echinococcus bursts or inflames, a fresh train of symptoms is superadded to those already mentioned. The clinical history of the affection will now vary, according to the direction in which the perforation takes place.

Perforation of the diaphragm, with escape of the contents of the cyst into the cavity of the pleura, is in most cases accompanied by severe pain, to which are added all the symptoms of pleurisy, proving rapidly fatal. In rare cases, a communication is ultimately established between the pleural cavity and one of the bronchi; and then there is a copious expectoration of purulent sputa, mixed with the membranes of the hydatids, and followed by the signs of pneumothorax.

When the hydatid of the liver involves the base of the lung, we find the ordinary signs of pneumonia, which runs a chronic course, and is limited to the lower portion of the lung; at this part, an extensive cavity is usually developed, accompanied with hectic fever. As soon as one of the bronchi is perforated, the quantity of expectoration suddenly increases, the signs of a cavity manifest themselves, and, in most cases, the characteristic remains of the hydatids, and sometimes likewise bile, are found in the sputa.[1] After this, the expectoration may gradually diminish and the patient recover, or death from hectic fever may ensue.

Perforation into the pericardium is always fatal under symptoms of *pericarditis acutissima.* A similar result follows the bursting of the sac into the peritoneal cavity,—an event which is indicated with sufficient clearness by the symptoms of peritonitis from perforation, together with the sudden collapse of the hepatic tumor.

When the cyst opens into the stomach or intestine, the hydatids are evacuated upwards or downwards, and sometimes in immense quantities. Lind counted upwards of a thousand. The perforation is in most cases preceded by severe local pain. Sometimes the orifice is so small, that the evacuation of the cyst is very tedious and incomplete. Air may pass from the stomach and intestine into the evacuated hydatid sac, with the effect of suddenly altering the extent of the dulness. The majority of the cases, where the perforation takes place in the manner just described, recover. (See Observation II., p. 29.)

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[1] When the sac is very large, the patient may continue to expectorate the hydatid vesicles for a long time. Budd observed a patient who expectorated these vesicles during twelve months, until he died from exhaustion. Another patient continued to expectorate the membranes of hydatids from time to time, during a period of nine years. At last the sputa consisted of pure pus, which was thrown up in great quantity whenever the patient bent the upper part of his body much forwards.

In the three recorded observations, where hydatids of the liver burst into the vena cava, the cases proved very rapidly fatal under symptoms of asphyxia, which was due to obstruction of the pulmonary artery.

The communication of the hydatids with the bile-ducts cannot in most cases be recognized during life; but we may presume that it has occurred, when jaundice is suddenly developed, or when symptoms supervene resembling those produced by the passage of a gall-stone, especially when these symptoms are accompanied by a diminution in the size of the tumor.

Lastly, the bursting of the hydatid into the hepatic veins—so far as our present knowledge extends—is followed by the symptoms of phlebitis and pyæmic infection, by metastatic deposits in the lungs, empyema, &c.

6. *Duration of the Disease.*

Echinococci of the liver are developed very slowly, and may exist for several years, before they cause death or terminate in recovery. One case has come under my own observation, where the disease had existed for at least seven years, and I have met with others, where the first symptoms of the affection had been noticed, two or three years previously. Barrier (*De la Tumeur Hydatique du Foie. Thèse.* Paris, 1840) has analyzed 24 cases, in reference to the duration of echinococcus of the liver. Among these there were 3, where the disease had lasted for at least 2 years; 8 where it had lasted from 2 to 4 years; and 4, where it had existed from 4 to 6 years; and in single cases the affection had existed for 15, 18, 20 or even 30 years.

7. *Modes of Termination.*

Hydatids of the liver not unfrequently undergo a spontaneous cure; the hydatids die, and are found at *post-mortem* examinations, without their existence having been suspected during life. In other cases, a cure takes place after the evacuation of the cyst through the stomach or intestine, or through the bronchi, or, occasionally, directly outwards. Moreover, many cures are brought about by medical treatment, puncture, injection of the sac, &c.

Notwithstanding this, a fatal termination is by no means uncommon, and may be induced in a variety of ways. In rare cases, it takes place by marasmus, caused by the echinococcus in the course of its growth, gradually compressing the greater portion of the hepatic parenchyma, and interfering with the functions of the neighboring organs. Death is more frequently induced by the sac bursting into one of the serous cavities, into the pleura, the peritoneum, or the pericardium, or by exhaustion following upon suppuration of the lungs, by inflammation of the hepatic veins and pyæmia, by plugging of the pulmonary artery, by inflammation and suppuration of the circumference of the sac, or by hæmorrhage into its interior, &c.

8. *Diagnosis.*

It has already been stated, that the diagnosis of hydatids of the liver is sometimes impossible; but, in most cases, this remark only applies to small defunct cysts, which are of no importance in medical practice. The existence of large echinococci, endangering life, is always more or less clearly indicated by a definite group of symptoms. Smooth, globular tumors of the liver, which are developed slowly, and are unattended by pain, or fever, or any remarkable derangement of the general health, and which, in addition to this, exhibit fluctuation, or hydatid vibration, must, generally speaking, be always regarded as echinococci of the liver. Hepatic abscesses, cancer of the liver, enlargement of the bile-ducts, aortic aneurisms and pleuritic effusions may be confounded with them; but, in most cases, it is an easy matter to avoid making any mistake.

Hepatic abscesses are distinguished by their more rapid development, by the coexistence of fever and pains, and by the early appearance of cachexia. There is no difficulty in the diagnosis, except when the sac of the echinococcus and the surrounding tissue become inflamed and suppurate; in this case it is only possible to avoid a mistake by an accurate knowledge of the previous history.

The uneven surface, density, and tenderness, which cancer of the liver usually presents, on making a local examination, are sufficiently characteristic to distinguish it, quite independently of the accompanying cachexia. Cases, however, are met with where the diagnosis is not an easy matter. This is particularly apt to occur in the case of the large soft cancers of the liver, which present a feeling of fluctuation on palpation; cancers of this nature may be confounded with hydatids of moderate size, especially when the latter are painful, as now and then happens. (See Observation, No. IV., p. 33.)

Enlargement of the gall-bladder, or *Hydrops Cystidis Felleæ*, may render the diagnosis difficult, from the circumstance that the form of the tumor resembles that of certain varieties of hydatids of the liver (Figs. 7 and 8). In most cases, however, this enlargement is preceded by jaundice and attacks of colic, and, in addition to this, the situation of the tumor rarely corresponds to that of the gall-bladder, the hydatid vibration is absent, &c.

Aneurisms of the aorta form smooth, semi-globular tumors, resembling those of hydatids; but their outline is different, and more or less spindle-shaped, and, moreover, they are the seat of pulsations, and often of acute pains.

According to my experience, it much more frequently happens that hydatids of the liver, rising up into the thorax, are mistaken for pleuritic exudations. The dulness produced by the hydatid projecting from the convex surface of the liver upwards into the thorax, the absence of respiratory murmur and of vocal fremitus, the dyspnœa, and, ultimately, the enlargement and fluctuation of the intercostal spaces, are all symptoms which are equally indicative of pleuritic exudation. A mistake is best avoided by carefully marking the upper margin of dulness throughout its entire extent; it is then found that the direction of such a line in the case of echinococci is very different from that produced by exudation into the pleura; in the former case it is arched upwards, and is at a lower level, close to the vertebral column and the sternum, than it is in the axilla; this does not hold good with pleuritic effusions. This difference is most remarkable in the early stage of hydatids of the liver, which is the very time at which the diagnosis is most difficult. It is also worthy of note, that the heart is displaced farther to the left, and, still more, upwards, than is wont to happen in the case of pleuritic effusions of like extent. The greater mobility of the tumors below the diaphragm, upon deep inspiration, must not be too much relied on. It is absent in echinococci, just as often as it is in empyema, owing to the circumstance of the diaphragm, which is displaced upwards, becoming adherent, and losing its contractility.

Circumscribed peritoneal exudations, lying between the liver and the diaphragm, may give rise to enlargement of the right hypochondrium, resembling that which occurs in hydatids of the liver; they are easily distinguished, however, by the symptoms of general or local peritonitis, which precede.

After an hydatid of the liver has burst into the lung, it gives rise to a train of symptoms which may cause it to be mistaken for purulent pneumonia, gangrene of the lung, or pulmonary tubercle. Here the previous history, the altered form of the lower part of the thorax, as well as the characters of the expectoration (such as the occurrence in it of vesicles, circles of hooks, bile, or sugar), prevent us making a mistake.

In doubtful cases, where the distinctive characters just mentioned are insufficient to enable us to arrive at a decision, we may make an exploratory puncture at the place where fluctuation is felt, with the object of confirming the diagnosis. This measure was long since practised by Récamier, and, when a fine trocar is selected, it is, in general, devoid of danger. The fluid which is obtained from an hydatid is distinguished from all other serous effusions by its limpid, watery character, and by the absence of albumen. When the hydatids are dead, it may be turbid and resemble whey, but then it is found to contain oil-globules and plates of cholesterine; and, moreover, the scolices, or the circle of hooks, which are usually found without difficulty, are sufficiently characteristic. The precautions which it is necessary to take in making the puncture will be spoken of under the head of Treatment.

9. *Complications.*

Echinococci of the liver are not unfrequently accompanied by echinococci of other organs of the abdomen or chest. Hawkins, Cruveilhier, and Andral have found hydatids, at the same time, in both the right and left lungs; Observation No. I. refers to a similar case. The cysts are always situated in the lower lobes of the lungs; they have thinner walls than those in the liver, and they often attain such a size as to cause death by asphyxia. Andral (*Clinique Médicale,* Tom. IV., p. 412, Observation No. V.), in a case of hydatid of the liver, found numerous cysts of the same nature in both lungs, which, on closer examination, were found to originate in dilated pouches near the commencement of the pulmonary veins.

Hydatids of the liver are often complicated with hydatids of the spleen. Cruveilhier and Andral have recorded several observations of this nature. Usually, however, the cysts are not imbedded in the parenchyma of the spleen, but are attached to its posterior surface.

Echinococci of the liver are likewise not unfrequently accompanied by hydatids situated between the folds of the mesentery, the mesocolon, or omentum, or beneath the peritoneum, and more or less completely filling up the abdominal cavity. In such cases the lungs remain for the most part exempt.

It is necessary to be acquainted with these complications of hydatids of the liver, inasmuch as they essentially modify the symptoms of the disease, and embarrass the diagnosis.

The mode of development of these echinococci, in different parts of the same individual, has not yet been satisfactorily explained. The relative anatomical characters of the different cysts favor the view that they are of different ages. Hence arises the question, whether they owe their origin to the absorption of embryos at different periods of time, or whether the oldest hydatid generates the germs of the more recent cysts, which are carried to the other organs by the current of the blood. Budd is inclined to the latter view, which he thinks is supported by the fact of the echinococci of the lungs appearing of more recent date, as compared with those in the liver; he himself, however, points out that the situation of hydatids of the spleen and mesentery, in relation to the liver, is opposed to the view, unless on the improbable supposition that the ova could be transported in a direction contrary to the current of the blood.

10. *Prognosis.*

Hydatids of the liver, as long as they continue to grow, or when they have already attained a great size, must always be regarded as a dangerous lesion, and particularly when they have already given rise to derangements of a local or general nature. The means at our disposal for inducing a retrograde metamorphosis in the cyst are uncertain in their effects, and not unfrequently endanger life. When the hydatids burst into the serous cavities—the pleura, the pericardium, and the peritoneum, the case almost invariably terminates fatally; and a like result ensues when they burst into the hepatic veins or the vena cava. Recovery takes place more frequently in those cases where a communication is established between the hydatids and the bronchi, and oftener still when the cysts burst into the intestinal canal. Death is very often induced by mechanical injuries of the hydatids, or by inflammation of the cysts themselves or of the surrounding tissues.

A favorable termination resulting from the spontaneous death of the echinococci, as a rule, only occurs in such forms as are never recognized during life on account of their small size; with the larger cysts, such a mode of termination can only be reckoned on in exceptional cases.

11. *Etiology.*

Echinococci of the liver are chiefly observed during the middle period of life, and are rarely found in childhood or old age. The youngest of my patients was seven and the oldest sixty-five years of age; and by far the most of them belonged to the period of life between thirty and fifty.

The lower classes of the population, as Budd has justly observed, suffer more frequently from the disease than the upper—a circumstance which must be attributed to their damp dwellings, and to the inferior, chiefly vegetable, nature of their food.

The essential cause of the formation of echinococci is the swallowing of the ova or embryos of the tænia echinococcus, which pass from the stomach or intestine into the liver, and there undergo development. Accurate observations are still wanting as to the manner in which this is accomplished. This much, however, is certain, that the mode of life of the population, as well as the degree of prevalence of tapeworms in certain districts, must exercise an important influence over the frequency of echinococci.

Hence it is intelligible how the prevalence of echinococci varies very greatly in different countries and districts. According to the statement of Schleisner, Eschricht (Von Siebold, *Ueber Band- und Blasen-würmer*. Leipzig, 1854, p. 112), and Guérault (*Gaz. des Hôpitaux*, 1857, p. 184), they are undoubtedly very prevalent in Iceland. Here, indeed, they are endemic, to such an extent, that a sixth portion of the population are afflicted with them. Their prevalence is found to vary in the different parts of Germany. So far as my experience extends, they are met with much more frequently in Breslau and Silesia than in Göttingen, Kiel, and Berlin; but, unfortunately, we possess no accurate statistical data upon the point. In France they are said by Leudet to be more common at Rouen than in Paris. In the United States of America, and likewise in India, they would appear to be very rare. According to Budd's experience, it is an exceptional occurrence for sailors to suffer from hydatids of the liver.

12. *Treatment.*

We are acquainted with no prophylactic measures for preventing the entrance of the embryo of the tænia echinococcus into the system, because the manner in which this is effected has hitherto eluded all investigation. Hence medical treatment can only be directed against the hydatids when already developed; and then the indications to be followed consist in inducing the death of the echinococci, and in removing the contents of the cyst by absorption, or by evacuation externally.

For the attainment of this object certain medicines have been employed, which are thought to pass from the blood into the cysts, and to kill their inhabitants. Baumes believed that calomel was endowed with this property; Læennec, common salt; and Hawkins, iodide of potassium;[1] but, as yet, no case is known in which any such plan of treatment has succeeded. Not much more is to be hoped for from the external application of cold.[2]

The surgical procedures, by means of which a large number of cases have been cured, while in many others speedy death has been the result, vary in their efficacy. Several methods of operation have been recommended at different times; and we proceed now to test their relative value, from the experience which has been already accumulated.

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[1] I was unable to detect any trace of a compound of iodine in the fluid from an hydatid cyst, removed from a woman, who had taken iodide of potassium for many weeks.

[2] The experiment has been tried in Iceland, as we are informed by Guérault, of endeavoring to destroy the hydatids, by introducing needles, and passing an electric shock through them. The result was successful; the tumor diminished and gradually disappeared entirely. Further observations are necessary before we can decide as to the value of this mode of treatment.

a. *Simple Puncture.*

The simple puncture, which has been practised, sometimes with a moderately large, and at other times with a fine, exploratory trocar, has always proved devoid of danger, provided such firm adhesions exist that no part of the fluid can escape into either the cavity of the chest, or into that of the peritoneum. Where there are no such adhesions, the puncture may give rise to dangerous symptoms, or even cause death.[1] Although such results are exceptions to the general rule, they render it imperative that we proceed with caution, that we only employ a fine trocar, and that, in drawing out the canula, we follow Boinet's advice, and press the punctured portion of the abdominal wall for a long time against the cyst with the fingers, until the edges of the small wound in the cyst have come together, and no further escape of fluid can take place into the abdominal cavity. After the removal of the canula, it is advisable to apply a compress and bandage, and to keep the patient perfectly quiet in the recumbent posture for twenty-four or forty-eight hours.

It may happen that the simple puncture is sufficient to effect a cure. Récamier (*Revue Médicale*, 1825, Tom. I., p. 25), Hawkins and Brodie (*Medico-Chirurgical Transactions*, Vol. XVIII.), Robert (*Gaz. des Hôpitaux*, 1857, p. 147), Boinet (*Revue de Thér. Méd.-Chir.*, 3—8, 1859; Schmidt's *Jahrbücher*, 1860, No. 7, s. 35), and Demarquay have recorded observations of this nature which I am able to confirm from my own experience. (See Observation No. IV., p. 33.)

In other cases the puncture must be repeated twice, or even oftener, before the cyst is destroyed.[2] The fluid ultimately discharged is often purulent, and requires a large canula for its evacuation.

As a rule, a cure is only effected by simple puncture, when the wall of the echinococcus-sac is thin and elastic, and when it contains no daughter-vesicles, or, at all events, but a small number. When the included daughter-vesicles are numerous, recourse must be had to a more complicated mode of operation.

b. *Puncture with subsequent Injection of Water, Solution of Iodine, Bile, &c.*

The quantity of fluid which escapes indicates whether the hydatid is solitary or contains numerous daughter- and granddaughter vesicles. The smaller the quantity of liquid, in proportion to the size of the cyst, the greater the number of vesicles which may be supposed to exist. When there is reason to suspect that their number is considerable, it is necessary to substitute a large canula for the small one, so as to enable the vesicles to pass through it. The canula may be allowed to remain, or may be replaced by an elastic catheter, of the same size, through which, as soon as we are satisfied of the existence of firm adhesions, pure water is injected, in order to wash out the pus and the shreds of the hydatid-membranes; these last, when necessary, are to be drawn out by means of a syringe. Diluted alcohol, solution of Iodine (Aran, *Archiv. Génér. de Méd.*, 5e Ser., T. IV., Boinet), or even bile (Leudet, Cadet de Gassicourt,[1] Dolbeau, Voisin), have been used instead of the water, with the object of preventing putrid decomposition of the contents of the cyst, and of exerting an alterative action on the walls of the cyst. Favorable results have been obtained from all three substances, although chiefly from the solution of Iodine, which has been employed most frequently. Bile has been tried, from the circumstance that it causes the death of the echinococci, and that it has likewise an antiseptic action. The few experiments which have been made with it show that it does not cause any pain, like alcohol and iodine, and that the fluid which escapes is destitute of any putrid odor. It is therefore deserving of further trial.

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[1] Moissénet (*Archives Générales de Méd.*, Févr., 1859) saw death take place eighteen hours after the puncture, although an exploratory trocar had been employed, and only a small quantity of fluid (350 grammes, or about 12¼ fluid ounces) had been drawn off. The patient fainted immediately after the operation, and rigors set in, followed by green vomiting and cold extremities, and, shortly before death, by pains in the abdomen. At the autopsy a small quantity of turbid serum, mixed with flakes of lymph, was found in the abdominal cavity. Robert, Demarquay, Dolbeau, and Jobert have observed symptoms of commencing peritonitis, which were, however, arrested. (Devaine, *op. cit.*, p. 568.) There can be no doubt, then; that the fluid of an hydatid excites acute inflammation of the serous membranes with which it comes in contact.

[2] Jobert, Hilton, and Owen Rees (*Guy's Hospital Reports*, 1848, T. VI.); Boinet (*op. cit.*), &c.

The injection of Iodine has been employed, not only, as just mentioned, for promoting the cure of the cysts, for which simple puncture has proved inefficient, but it has likewise been resorted to as the best method for subjecting the echinococci to the poisoning influence of the iodine. Aran, in one case, drew off, by means of an exploratory trocar, 750 grammes (26½ fluid ounces) of fluid, and injected a mixture, composed of 50 grammes of tincture of iodine, 50 grammes of water, and 2 grammes of iodide of potassium,[2] which was allowed to remain in the cyst. No pain ensued, but, some hours after, symptoms of iodism and rather violent fever set in, which lasted for six days; from this date a gradual cure commenced, which was permanent. Chassaignac and Vigla adopted this plan of treatment with good results. Velpeau, Larrey, and Demarquay tried it in the case of hydatids of the thoracic walls and of the thigh; but finding it unsuccessful, were obliged to have recourse to incision. One case, recorded by Boinet and Mesnet, terminated fatally.

c. *Opening of the Echinococcus-sac by means of Caustic.*

Although the plan of opening the echinococcus-sac by means of caustic was practised long since, it was first adopted by Récamier (L. Martinet, *Clinique Médic. de l'Hôtel-Dieu de Paris*, 1827; *Revue Médic.*, T. III., p. 436), with the object of preventing the escape of the contents of the cysts into the abdominal cavity. The mode of procedure is the same as that already described under the head of "hepatic abscess." (See page 157.) Récamier employed caustic potash; but, more recently, a preference has been given to Vienna paste, from the circumstance that its effects are more easily circumscribed. The application of the caustic is either repeated, until, after the separation of the slough, the sac bursts of itself; or, when the cyst is reached, it is opened with a knife, or large trocar. The operation is painful and tedious, and the adhesions are not always sufficient to prevent entirely an escape of the contents of the cyst into the abdominal cavity. This unsuccessful result, however, has chiefly happened in cases where the application of the caustic has not been continued sufficiently long, or to a sufficient depth. Davaine has collected twelve cases, which were treated by this plan; six recovered, and five terminated fatally. In four of the cases, however, the unfavorable result could not be attributed to the cauterization; in one case, death was induced by some nervous disease; in another, by careless dressing; while, in two others, it was due to the large number of the cysts.[1]

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[1] Cadet de Gassicourt saw pure bile escape from an hydatid sac which had been punctured. As long as the bile continued to flow, the pus completely disappeared. A cure took place after the open bile-duct had closed up.

[2] The above proportions would about correspond to those in the following prescription:—℞. Potass, Iod. gr. xxxiv.; Tinct. Iodin.; Aq. āā ℥ ij.—TRANSL.

d. *Incision.*

A simple incision into the hydatid sac is permissible, when the tumor threatens to burst externally, and the integuments are already red, or when we are certain of the existence of firm adhesions. It has likewise been practised repeatedly, when, from an erroneous diagnosis, another tumor has been mistaken for an hydatid. The operation has sometimes been successful, and at other times, fatal, the result being for the most part dependent on the existence or non-existence of sufficient adhesions; Russel (*Archives Générales de Méd.*, 1838, T. I., p. 106), drew off two thousand hydatid cysts, from the size of a goose-egg to that of a pea, through an incision, two inches long, between the umbilicus and ensiform cartilage. The patient made a permanent recovery. Ruysch, Récamier and others mention cases where the operation was unsuccessful.

A more certain plan is to make the incision at two different times, first down to the peritoneum, and then, after the wound has been dressed for some days with charpie, into the cyst. This mode of operating has as yet been tried in only a few cases. Rayer and Velpeau found it unsuccessful in the case of multiple hydatids; but good results have been obtained from it by Jarjavay (*Gaz. des Hôpitaux*, Nos. 89 and 100), and likewise by Ried and Brehme (*Deutsche Klinik*, 1857, No. 39).

The Indications for Operative Interference in Hydatids of the Liver.

It is often a difficult question to determine, whether and when we ought to have recourse to operative interference, in the case of echinococci of the liver. Are we justified in subjecting the patient to the danger of an operation, which not unfrequently is fatal, on account of a tumor, which may possibly exist for ten or twenty years, without causing great inconvenience, and which, moreover, in many cases undergoes a retrograde metamorphosis without any medical interference whatever? Certainly not, if we could predict such a lengthened duration with any certainty, or if the spontaneous cure of those forms of echinococci, which are sufficiently large to be recognized, were a matter of frequent occurrence. Unfortunately the real state of the case is very different. Most hydatids of the liver, which attain to such a size, as to admit being diagnosed and become the objects of medical treatment, when not operated upon, go on increasing, and put an end to life in from one to four years, or frequently in a still shorter period. Thus, when nothing is done, the prospect of an early death is tolerably certain.

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[1] Leudet of Rouen regards Récamier's method of opening the hydatid sac as the best. He has practised it twice with success; in a third case death resulted from rupture of the adhesions and peritonitis. (*L'Union Méd.*, No. 90, 1859.)

A second question is, should an operation be delayed until threatening symptoms drive us to it, or ought it to be had recourse to, when the patient is still in comparatively good health ?

It is not an easy matter to decide in favor of the latter proposition; and yet, we must not delay interference too long, because the danger increases; the thicker and more inelastic the walls of the cyst become, the more they lose their pliability and their power of contraction, the more the liver becomes atrophied from pressure, and the more the surrounding tissues are removed, quite independently of the rapid termination which may occur at any moment, from the bursting or inflammation of the cyst, &c. We ought, therefore, to operate as soon as the cyst elevates the abdominal or thoracic wall, and as soon as it can be reached with certainty, without any important injury to the surrounding parts. In the case of comparatively small and young echinococci, we may not unfrequently succeed by means of simple puncture with an exploratory trocar, in killing the entozoa and in inducing a retrograde metamorphosis of the cyst. Several years ago, I obtained such a result from a puncture which was originally made for the purpose of diagnosis, and since then I have treated three cases successfully in the same way. I have been in the habit of drawing off only two ounces fluid, and have repeated this operation several times, and, after the escape of the fluid, I have always thrust the fine canula in various directions through the cyst, as far as its wall, so as to irritate the lining membrane and rupture the individual vesicles, with the view of destroying the entire colony. In no case did any dangerous symptoms supervene, and in two cases I was able to trace a diminution in the size of the cyst for a long time after; I lost sight of the third case, but previous to my doing so, a diminution had already taken place in the swelling. In two cases of large hydatids, the operation was quite unsuccessful; the cysts went on growing without interruption. Budd (*Medical Times and Gazette*, May, 1860), has quite recently recommended that an exhausting syringe be combined with the exploratory trocar, with the object of facilitating the evacuation of the fluid and of preventing the entrance of air into the cyst, and by following this plan he has obtained a favorable result.

In the case of the larger and older cysts, the exploratory trocar is not sufficient, and, if we wish to effect their destruction, we must have recourse to a larger canula, so as to evacuate the contents completely.

When there is a large number of daughter-vesicles present, as may be ascertained by the signs above laid down, the simple puncture is, in most cases, followed by suppuration, and we must then inject water into the cavity of the cyst, and remove the vesicles as far as practicable, if necessary by means of suction, by dilatation of the punctured wound, with sponge tents, by incision, &c., and afterwards inject iodine or bile, in order to prevent putrid decomposition, and to bring the wall of the cyst into a condition favorable for cicatrization. It is obvious that cicitrization cannot be easily effected in the case of old, large cysts, with rigid, cartilaginous or calcified walls;[1] the softer and more yielding the cyst remains, and the more easily it collapses, the more readily will the desired result be obtained.

Before having recourse to any operation, it is always an important question to determine, whether or not we can calculate on the existence of firm adhesions between the capsule of the hydatid and the abdominal or thoracic wall. When we are not certain of finding firm adhesions, we ought to restrict ourselves in the first place to making a puncture with an exploratory trocar, or, when the symptoms demand prompt interference, we ought to allow the canula to remain in, or have recourse to, Récamier's process, or the incision at two different times.

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[1] When, by means of palpation or the exploratory trocar, this condition of the wall of the cyst is recognized in time, we ought to abstain from all operative interference.

To determine the question, whether adhesions exist or not, we may follow Budd's advice, and mark the margins of the tumor, or the lower edge of the liver, with ink, and then try whether these boundaries are altered by change of position or by forced inspiration, and we may likewise notice, as Boinet has recommended, whether the most prominent part of the tumor always remains fixed at the same spot.

When the hydatids burst into the lungs, the stomach, or the intestine, or into the abdominal or thoracic cavity, our treatment must be directed against symptoms, and we must be guided by the general principles which have been already laid down for the cases in which abscesses of the liver open in these different directions.

By way of illustration, I may give here the details of a few interesting cases of the disease under consideration, selected from my own experience.

13. *Illustrative Cases.*

Observation No. I.

Echinococcus of the Right Lung and of the Liver.—Rupture of the Hydatid in the Liver and of the Hepatic Tissue, in consequence of a fall.—Hœmorrhage into the Hydatid sac.—Sudden Death.

Ernestine Kliensporn, aged 26, a servant-maid, was brought dead to the Hospital on April 7th, 1854. She had fallen from a flight of stairs upon her abdomen, which, for a long time before, had been swollen. She died a quarter of an hour after the accident.

Autopsy, April 8th.

The body was large and well-nourished. The countenance was flushed. The abdominal walls were marked by the cicatrices of previous pregnancy.

The skull-cap was thick, and the cranial cavity small. The sinuses contained fluid blood. The brain and its membranes were somewhat anæmic.

The rima glottidis was narrowed from œdema of the aryteno-epiglottidean ligaments and of the vocal cords. The ventricles of the larynx were filled up. The mucous membrane of the trachea was injected and covered with froth. The thyroid gland was enlarged and congested.

The lungs were non-adherent; posteriorly and inferiorly they were congested; superiorly, they were very œdematous. At the lower part of the right lung, and encircled by its base, a cyst was found, measuring three inches in diameter, with firm, fibrous walls, and only connected to the diaphragm by a small band of connective tissue. The sac was lined by the thick, gelatinous membrane of an hydatid, upon the inner surface of which numerous white dots could be observed. The cyst contained a clear, limpid fluid, but no daughter-vesicles. The bronchi were filled with a reddish froth, but did not communicate with the sac. The pericardium was smooth. The muscular tissue of the heart was flabby and shrivelled; its valves were normal.

There was no fluid in the abdominal cavity. The suspensory ligament of the liver was stretched over an oval tumor, the size of a child's head, which adhered to the margin of the left lobe of the liver. It was covered by omentum and by the hepato-duodenal ligament, and was connected by ligamentous adhesions to the surrounding parts. Its wall was of a fibrous character, while its inner surface was lined by a thick, greenish-white, gelatinous mother-sac, which was filled with a clear, colorless fluid.

A second collapsed cyst was found at the lower and anterior margin of the right lobe. This was intimately connected to the liver, so that a layer of hepatic tissue could be traced for a long distance over its outer surface. It measured four inches both in length and breadth, and was filled with shreds of the detached and ruptured gelatinous membrane, which flowed out immediately that the cyst was opened. At the upper wall of the sac, where it penetrated into the right lobe of the liver, there was an irregular rupture, one inch in length, passing directly into the glandular tissue. This rupture led into a canal three inches in length, directed upwards, the walls of which were formed by disintegrated hepatic parenchyma. The hepatic tissue, at certain places, was detached from the coats of a branch of the portal vein, which, in the position of the preparation, lay at the bottom of the canal (Fig. 8). The surrounding hepatic tissue was much softened and infiltrated with blood. In other respects, neither the external surface nor the parenchyma of the liver presented anything abnormal.

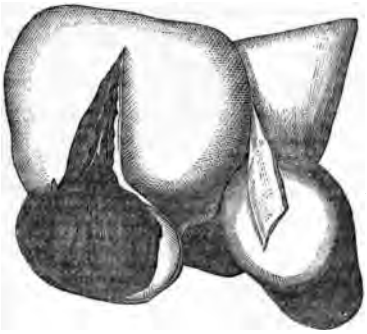

FIG. 8.—The liver viewed from the upper surface. To the right of the figure is seen a large hydatid cyst attached to the margin of the left lobe, with the suspensory ligament stretched over it. To the left is another cyst, projecting from the anterior border of the right lobe, and laid open, so as to show the rupture at the upper part passing into a canal surrounded by disintegrated hepatic tissue, and exposing a branch of the portal vein.

The gall-bladder was not interfered with by the tumors, and contained clear yellow bile.

The spleen was enlarged and soft.

The kidneys were normal.

The solitary glands of the ileum were enlarged, so as to resemble pearls; but the mucous membrane of the stomach and intestines was, in other respects, normal.

The uterus was enlarged, and the os was closed up by a plug of mucus. At its fundus, it contained an ovum, measuring an inch in diameter.

The right ovary contained a corpus luteum, the size of a hazel-nut.

OBSERVATION No. II.

Blow on the Hepatic Region from a log of wood.—Severe Pain.—An Oval Tumor at the margin of the False Ribs.—Sudden increase of the Pain.—Pulselessness.—Hydatids passed with the Stools.—Diminution of the Tumor.—Diarrhœa.—Repeated Attacks of Rigors.—Jaundice.—Anœmia.—Extreme Exhaustion.—Tedious Recovery.

Carl Berger, an apprentice-baker, aged 16, was admitted into Hospital on the 14th of June, 1858, and discharged on the 2d of August. During his childhood, this boy had passed through various diseases, of which he was unable to give any accurate account. From his eleventh year, however, he had been perfectly well, and strong, and for two years he had worked hard as a baker's apprentice. On the 4th of June, when at work, one of his comrades struck him so severely with a log of wood over his right side and back, that he experienced acute pain, and became seriously ill: he lost his appetite, complained of nausea and headache, and was obliged to betake himself to bed. After laying at home for five days, without applying for medical advice, he was brought to the Hospital on June 14th.

On admission, he complained of giddiness, headache, sensations in the limbs like those resulting from a bruise, and pains in the right hypochondrium. A very tender, oval tumor, could be felt at the margin of the false ribs on the right side.

On June 19th, very violent pains came on suddenly at the place just mentioned. The patient became pulseless, cold and apathetic, but still retained his consciousness.

On the 20th, it was noticed that the tumor at the margin of the ribs had disappeared, and, at the same time, four little vesicles were found in the stools, varying in size from a hazel-nut to a walnut. These vesicles were ruptured, and were of a yellow color; they presented the reaction of bile-pigment, and, when examined microscopically, exhibited the concentric layers, the amorphous appearance, &c., characteristic of the contents of an echinococcus-sac. No festoons of hooklets or solitary hooklets could be found. Pulse 104; no appetite; tongue moderately coated; the stools were thin, and contained but little bile, excepting those which were passed after taking purgatives; there was no jaundice. The liver measured 8 centimètres (3·149 Eng. inches) at the epigastrium and 13 centimètres (5·118 Eng. inches) in the mammary line; the region of the tumor, which had formerly been felt, was tender upon pressure. There was no enlargement of the spleen. Heart's sounds normal. Skin dry and desquamating. Urine of a dirty-yellow hue, but free from bile-pigment.

On the 24th, three stools in the day, of the same character as those passed before, but without any admixture of hydatids. Slept quietly. The liver was less painful; the left lobe still stretched far into the left hypochondrium. Appetite good. Urine free from bile-pigment and albumen. Pulse 84.

On the 25th, stools quite pale and very thin. Pulse 86.

On the morning of the 26th, had some epistaxis and vomiting, without any obvious cause. Three pale, thin stools in the day. Urine brownish-yellow. Appetite good. Pulse 96; temperature somewhat elevated.

On the 27th, liver painful; appetite diminished; pulse 120. In the afternoon a rigor, followed by sweating. Stools unchanged.

On the 29th, pulse 96. To-day the patient felt better. Urine of a deep-brown hue, free from bile-pigment. Two stools the same as formerly. Appetite very slight. Some perspiration during the night. Temperature scarcely elevated. Hepatic region less tender. Infusion of Cinchona Bark, with Gum Arabic, was prescribed.

On the 2d of July, pulse quiet; no rigor; appetite improved; skin, dry.

On the 6th, the patient felt well. Appetite good: tongue clean; stools firm. Slept well. No pains in the hepatic region or in the epigastrium; no distention of the stomach.

Early on the 11th, the vomiting returned, and was followed by increased frequency of pulse, which in the afternoon rose to 120. The skin, and likewise the urine, exhibited a jaundiced hue; the evacuations from the bowels were very thin, and of an ash-gray color. The hepatic region was very tense and painful. The patient was ordered to have warm cataplasms applied locally, and to take Decoction of Althæa with Aqua Laurocerasi internally.

At 10 A.M. of the 12th, the patient had an attack of rigors, followed by heat and sweating. Pulse 120 and small. The urine brown, passing into green. Slight pains in the right hypochondrium; remarkable distention of the epigastrium.

On the 13th, the jaundice had increased. Urine brownish-black. The patient complained of pains extending from the ensiform cartilage to the umbilicus. The stools were pale and clay-covered. Pulse 112; temperature moderately elevated; skin dry. Slept well.

On the morning of the 14th, the patient had another attack of rigors, lasting for a quarter of an hour, and followed by sweating; the jaundice had somewhat diminished; the stools contained no bile; the epigastrium was still constantly tense. The specific gravity of the urine was 1009; the reaction of bile-pigment was indistinct. Pulse 108.

On the 15th, pulse 100; constant sweating; stools the same as formerly; urine paler; jaundice diminished. A faint, systolic, anæmic, blowing murmur was heard over the heart. No appetite whatever; tongue moist and clean. The specific gravity of the urine was 1006.

On the 16th, pulse 96; stools brown; jaundice much diminished. Urine still dark, but paler than formerly. Appetite somewhat improved; no pain in the region of the liver; no rigor.

On the 18th, pulse 96; skin cool and dry; no rigor for three days; slept well; appetite increased; stools darker; urine free from bile-pigment. Decoction of Cinchona Bark was prescribed.

On the 20th, pulse 84; the patient could take a deep breath, without feeling any pain; no pain in the region of the liver; great anæmia and emaciation.

On the 21st, pulse 72; the patient had slept well and felt in good health; two thin stools; appetite good.

On the afternoon of the 22d, the patient had another paroxysm of fever without any rigor.

On the 23d, stools pale-yellow; no pain in the epigastrium.

On the 26th, the urine deposited a copious sediment of lithates, but contained no bile-pigment. Appetite improved; stools still thin, pale and pultaceous. Pulse very small and easily excited. The patient was able to leave his bed.

On the 2d of August, the boy was discharged from the Hospital, at the request of his father. The anæmia and emaciation were still considerable; but the fever, jaundice, and other symptoms referrible to the liver had entirely disappeared.

It is worth noticing, that the perforation did not occur until fifteen days after the contusion of the liver. To all appearances, it was preceded by inflammation of the cyst, which led to adhesion, and ultimately to perforation of the intestine.

The passage of the contents of the cyst into the intestinal canal gave rise to profuse diarrhœa.

The attacks of rigors, which recurred repeatedly after the occurrence of perforation, must be referred to an increase of the inflammation in the cyst and to its suppuration, in all probability caused by the passage of the contents of the bowel into its interior. It is uncertain, whether the jaundice was the result of the lateral compression of the ductus choledochus by the inflamed cyst, or whether it was due to the supervention of catarrh of the bile-ducts. The evacuations were repeatedly examined with great care for tapeworms, which might have been developed from the contents of the hydatid-sac passing into the bowel, but no trace of them could ever be discovered.

OBSERVATION No. III.

Contusion of the Right Hypochondrium.—Hæmoptysis.—Persistent Pains in the lower part of the right side of the Thorax.—The physical signs of a globular Tumor, projecting upwards from the Liver into the thoracic cavity.—Purulent Sputa.—Hectic Fever.—Death from Exhaustion.

Autopsy:—Hydatid of the Liver, communicating with an abscess of the Lung.

Adolf Schramm, a laborer, aged 39, was admitted into Hospital, on December 12th, 1857, and died on February 8th, 1858. The patient referred his present illness to a fall upon the right side, which had occurred in the year 1850, and which had compelled him, owing to the hæmoptysis which ensued, to keep his bed for eight days. Since that time, he had often experienced pains in the lower part of the right side of the chest, and in the region of the liver. A year and a-half before admission, he had suffered from these pains for three weeks, and since then they had returned repeatedly. For seven weeks before admission, the pains had again been more severe; while at the same time the appetite had completely failed, the patient had been troubled with frequent vomiting, and had been slightly jaundiced.

On admission, the epigastrium and right hypochondrium were tense and painful; the lower intercostal spaces on the right side were enlarged, tense, and elastic. The upper part of the right side of the chest presented nothing abnormal; at the lower part, the dulness commenced at the nipple over the fifth rib, and extended 18 centimètres (about 7 Eng. inches) downwards to the level of the umbilicus; in the axilla the dulness extended about 3 centimètres (1⅕ Eng. inch) higher, and its total perpendicular extent was here 21 centimètres (8¼ Eng. inches); close to the sternum, the dulness commenced at the base of the ensiform cartilage, and measured 12 centimètres (4¾ Eng. inches); close to the vertebral column, the pulmonary sound reached 5 centimètres (2 Eng. inches) farther down than in the axilla. The sharp edge of the liver could be distinctly felt at the lower margin of the dull space. These signs appeared to indicate the existence of a globular tumor projecting from the upper surface of the liver into the cavity of the thorax. There was no displacement of the heart, and the sounds of this organ were normal. Infusion of Rhubarb with Aqua Laurocerasi was prescribed.

On December 14th, the pain was less severe, and there was some bile-pigment in the urine.

On the 22d, the pain had again increased, so that the patient was unable to move. In other respects, the general symptoms were favorable. Pulse 76; temperature normal. Leeches and warm cataplasms were ordered to be applied over the seat of pain.

On the 27th, pulse 60, and irregular; temperature reduced; cough, with purulent sputa. The dulness had extended farther towards the vertebral column. The pains were somewhat less severe. Infusion of Senega Root was prescribed.

January 6th, 1858. The abnormal signs presented by the thorax continued the same as before; but the general symptoms had assumed an unfavorable aspect. The patient was collapsed, and from time to time had an attack of rigors, followed by heat and perspiration. Pulse 90 and small; no appetite; stools and urine normal. Infusion of Cinchona Bark with Liquor Ammoniaci Anisatus [1] was prescribed.

On the 10th, pulse 80 and small. The patient was delirious and got out of bed without any object. Bowels confined; cough less troublesome; the dulness had slightly extended; the vocal fremitus was completely absent; the diaphragm could not be observed to act on the right side. The impulse of the heart could be felt immediately below the left nipple. The patient was directed to continue taking the Cinchona Bark, and Rhubarb was prescribed to counteract the constipation.

On the 17th, frequent, thin stools; nocturnal perspirations; sleeplessness. To continue the Cinchona, and in the evening to have a grain of Opium.

On the 19th, the diarrhœa had ceased; moderate appetite; œdema of the feet.

On the 25th, great muscular prostration; stools firm; no change in the tumor.

On February 2d, the diarrhœa had returned; cough somewhat increased; appetite voracious; pulse 70.

On the 6th, pulse 76, very small, and scarcely perceptible; great prostration, but consciousness unimpaired. Infusion of Cinchona with Sulphuric Ether was prescribed.

Death from exhaustion occurred on February 8th.

Autopsy, 24 *hours after death.*

There was nothing abnormal in the cavity of the cranium.

In the thoracic cavity, the diaphragm on the right side was pushed up by the liver, as high as the third rib. The liver at its upper part was covered, to the extent of about two inches, by a portion of the lung, which at this place contained a soft, elastic tumor. The liver occupied an oblique position, and the suspensory ligament lay to the left of the linea alba. A sac, nearly as large as a child's head, was observed in the upper part of the right lobe of the liver. This sac ruptured on attempting to take out the liver, and discharged a greenish-yellow purulent fluid, mingled with flakes of dead echinococci. The sac was firmly adherent to the diaphragm, and its upper part presented an opening large enough to admit the finger, by which it communicated with an abscess in the lower lobe of the right lung. The cavity of this abscess was traversed by numerous trabeculæ, and filled with putrid pus; it was surrounded by hepatized pulmonary tissue. The upper lobe of the right lung appeared œdematous, but in other respects was normal. (See Fig. 9.)

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[1] See Page 92.

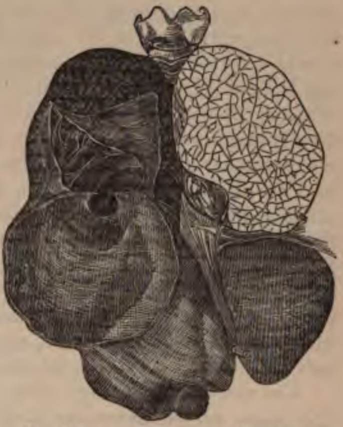

FIG. 9 represents the parts described under Obs. III. In the right lobe of the liver there is a large hydatid sac, communicating by a circular opening with an abscess in the lower lobe of the right lung. The cavity of this abscess is seen traversed by numerous trabeculæ.

The heart was small; its valves were normal.

The mucous membrane of the pharynx, œsophagus, and larynx, and likewise of the stomach, was pale.

Spleen small and anæmic.

The pancreas occupied a perpendicular position, being pushed towards the left side, beyond the vertebral column.

The small and large intestines were anæmic. Kidneys normal. Urinary bladder distended with pale urine.

OBSERVATION No. IV.

Extensive, painful, fluctuating Tumor of the Liver of several years' duration.—Dyspnœa.—Dyspeptic Symptoms.—Cachectic Appearance.—Puncture of the Tumor.—Repeated Rigors.—Tedious Convalescence.—Recovery.

Herr v. N., aged 46, went to Karlsbad five years ago (1855), on account of a swelling in the region of the liver, and returned in the summer of 1860, in a very exhausted condition. He was emaciated; his color was pale, and his disposition highly irritable. Every movement was accompanied by severe pains in the right hypochondrium, and in the lumbar region, so that the patient could neither raise himself nor lie down without great difficulty. The appetite had completely failed; the bowels were confined; the patient complained of dyspnœa, with a short, dry cough; pulse 70 and small.

The right hypochondrium was arched outwards, tense, and painful upon pressure. The dulness in the right mammary line extended from the fifth rib 11¾ inches downwards to below the umbilicus. Fluctuation could be felt in the epigastrium, and likewise at the outer border of the rectus muscle, three inches below the edge of the thorax on the right side. The lower margin of the tumor could be felt to be of a globular form, and could be traced as far as the cartilage of the eighth left rib.

The spleen was small; there was no effusion in the abdominal cavity.

The heart was pushed somewhat upwards and to the left, but in other respects was normal. The lungs were healthy.

The persistent pain and the cachectic appearance of the patient had caused the tumor in the liver to be regarded as of a cancerous nature; but taking into consideration the distinct fluctuation, the globular form and the long duration of the tumor, I could not assent to this view of the case. On the 2d of July, my colleague, Professor Langenbeck, who agreed in my diagnosis of an echinococcus of the liver, punctured the tumor with a trocar, the size of a crow-quill, at the outer margin of the rectus muscle, two inches below the margin of the ribs. Upwards of three quarts of a clear watery fluid were drawn off. The fluid was free from albumen and had an alkaline reaction, but contained no trace of echinococci, or of their membranes or hooklets. A towel, soaked in cold water, was applied over the upper part of the abdominal region, and Decoction of Tamarinds with Sulphate of Soda was prescribed.

July 5th, pain in the region of the liver; rigors alternating with heat; pulse 96; obstinate constipation. Two grains of Calomel were ordered to be taken three times daily, and at the same time directions were given to rub in Mercurial Ointment over the swelling.

On the 7th, 8th, and 10th, the patient had repeated attacks of rigors; the pulse varied between 90 and 110 until the 12th, when it fell to 60. The tenderness on the right side had now entirely ceased; the hypochondrium and epigastrium felt soft; the extent of dulness was reduced from 11¾ inches to 4 inches; the lower edge of the liver could no longer be reached with the fingers. There was no improvement, however, in the digestion, and the bowels were only slowly moved under the use of Infusion of Rhubarb, and remedies of a similar nature. It was not until the 29th of July, that the patient had so far recovered as to be able to return to his own home.

After an interval of about a month, the patient had another rigor, with anomalous symptoms, apparently owing to exposure to cold and errors in diet; the liver was again tender; the appetite had ceased, and the nutrition had fallen off. Attention to diet, absolute rest, small doses of Quinine and blisters to the region of the liver gradually removed these disorders (which had induced us to apprehend the occurrence of suppuration of the walls of the cyst), and led to a permanent cure.

This case was evidently an instance of a sterile echinococcus of very considerable dimensions. Simple puncture, by means of which, together with pressure, the sac was emptied as far as possible, was sufficient to light up an inflammation of the walls of the cyst, ending in its destruction. The frequent attacks of rigor which came on after the operation, at two different periods, with an interval of several weeks, render it probable that purulent effusion had taken place into the sac, and become inspissated as a result of absorption, before the sac was destroyed. If numerous daughter-vesicles had been present, repeated evacuation of the contents of the cyst, and the injection of bile or iodine would have been necessary, in consequence of the remarkable size of the echinococcus.

Professor Langenbeck has communicated to me two other cases of echinococci of the liver, cured by a simple puncture, which have come under his observation. In one of the two cases, as in that just detailed, the echinococcus was sterile; the fluid discharged from the other deposited a white sediment upon standing, which consisted chiefly of young echinococci; no vesicles or membranes, however, were found in it;

so that in this case, likewise, no daughter-vesicles appear to have been present.

This absence of daughter-vesicles is of great importance in reference to the result of the operation. The more abundant the fluid which escapes by the puncture in proportion to the size of the tumor, the fewer daughter-vesicles may be expected to be present, and the more favorable will be the prognosis. A cure can be effected most easily in the case of the simple sterile cysts.

APPENDIX

TO

SECTION ON HYDATIDS.

COMPOUND HYDATIDS; MULTILOCULAR HYDATID TUMOR OF THE LIVER.

1. *Historical Account.*

The first two observations of this peculiar form of echinococci of the liver were published by Buhl (*Illustrirte Münchener Zeitung*, 1852, Bd. I., s. 102, and *Zeitschrift f. ration. Medicin.* N. F., 1854, Bd. IV., s. 356). Buhl, however, failed to recognize the real nature of these new formations, and confounded them with alveolar colloid. Luschka and Zeller (*Alveolar colloid der Leber. Inaugural Abhandlung*, Tübingen, 1854,) were the first to find young echinococci in the tumor, and to point out the distinctions between it and colloid cancer of the liver. A fourth case came under the observation of Virchow (*Verhandl. der Physik. Medicinischen Gesellschaft in Würzburg*, 1856, Bd. VI., s. 84), who drew a distinction beween this new formation and the gelatinous tumors, and referred it to the cystic entozoa, under the designation of a multilocular echinococcus. Quite recently, Griesinger (*Archiv f. Heilk.*, 1860, Bd. IV., s. 547), has recorded a fifth case of this form of hepatic tumor.

In addition to these cases, which have been carefully examined, others are to be found recorded, which probably are referrible to the same head, but which have not been described in such a way as to enable us to form an accurate opinion regarding them. Such, for example, are the preparations in the Museum at Zurich, which have been described by W. Meyer (*Zwei Rückbildungs-formen des Carcinoms. Inaugural Dissertation*, Zurich, 1854), and likewise those in the Prague Museum described by Dittrich (*Prager Vierteljahrsschrift*, 1848, Bd. III.), &c.

2. *Anatomical Description.*

There are certain forms of echinococci of the liver, where the hydatids are not enclosed in a mother-sac, but are developed in large numbers close to one another. In this way are formed extensive tumors of an alveolar character, which undergo suppuration at the centre.

The tumors belonging to this class consist of a fibrous stroma, presenting the ordinary appearances of connective tissue, with spindle-shaped and caudate cells interspersed through it, and enclosing portions of the hepatic tissue, which at some places is occasionally in a state of fatty-degeneration, but at others, particularly near the surface, is loaded with pigment. Imbedded in this stroma are a number of rounded, elongated, sinuous, or irregularly-formed hollow spaces, varying in size from a millet-seed, or less, up to that of a pea,[1] most of which communicate with one another by openings of greater or less size.

These alveoli contain gelatinous cysts with structureless walls, which are made up of numerous layers, so that a transverse section exhibits a number of fine parallel lines, just as in the case of an ordinary echinococcus cyst. These cysts contain fine granules and oil-globules; their form is rarely globular, but they are usually collapsed and folded inwards; sometimes they are marked by numerous fissures, or are furnished with lateral bulgings which extend into the adjoining cavities. The large cavities are often found to contain two or more cysts lying close to one another, and occasionally also gelatinous masses. In water, the gelatinous masses can be easily spread out into membranes, from which completely closed cysts, varying in size from a millet-seed to a hemp-seed, become separated. These small cysts appear to be enveloped in the gelatinous masses. The membranes of the cysts undergo the same changes as those of the ordinary echinococci; they often become brittle, or deposits take place in them of pigment, or of a granular fatty matter refracting the light. Along with these cysts, and lying between them, we very frequently find globules, presenting concentric or radiated markings, and with one or many centres. These globules consist of an organic base impregnated with calcareous salts, and differ in their size from the calcareous bodies of ordinary echinococci. In addition to these bodies, needle-shaped, or sheaf-shaped crystals and hæmatoidine, in a granular or crystalline form, may be often observed.

In certain of the gelatinous cysts, and particularly in those contained in the large alveoli, fine white points may be seen with the naked eye, which, under the microscope, are found to be echinococci furnished with festoons of hooks and calcareous corpuscles, and differing in no respect from those above described.[2] The majority of the cysts, however, are always sterile.

In all the cases hitherto observed, the central portions of the tumor had passed into a state of suppuration. A cavity, the size of a fist, or sometimes even larger than a man's head,[3] is found occupying its centre. This cavity is filled with a dirty-yellow or greenish puriform fluid, which upon standing deposits a yellowish-white sediment, consisting of oil-globules, and a few compound granular cells and crystals, together with gray membranes and small vesicles. The lining membrane of the cavity has its surface marked by numerous pits and depressions; it is furnished with saccular dilatations, which pass into the adjoining cavities, and is covered with a layer of a yellowish matter, containing gelatinous vesicles, as large as a hemp-seed. Other vesicles of the same nature are found imbedded in the empty alveoli forming the wall of the cavity.

In addition to the principal tumor, others of smaller size, and isolated, are found in the tissue of the liver. Virchow likewise observed processes resembling strings of pearls, passing like roots from the tumor towards the outer surface of the gland, and sending prolongations towards the fissure of the liver, and even beyond it, along with Glisson's capsule

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[1] Virchow estimated the size of the small cavities at from 0·03 to 0·16 millimètre (·0141 to ·075 line), and that of the larger ones at from 0·3 to 0·4 millimètre (·141 to ·188 line). Some of the alveoli were 6 millimètres long, and 2 or 3 millimètres broad (nearly 3 lines long and 1 or 1½ lines broad).

[2] Virchow entirely failed in discovering the hooks in some of the echinococci.

[3] The diameter of the cavity in Griesinger's case amounted to 30 centimetres (12 Eng. inches). It contained 16 pints of purulent fluid.

(which was 6 centimètres, or 2·36 Eng. inches in breadth) as far as the bowel. Here there could be everywhere seen rosary-like cords accompanying the bile-ducts and portal vein, and, at many places, causing their walls to bulge inwards in a nodulated manner. The bile-ducts, the portal vein, the hepatic veins and the hepatic artery, wherever the new-formation extended, were here and there constricted and compressed. In the cases recorded by Dittrich and Buhl, the gelatinous masses followed the tissues of the portal canals in a similar manner, while Griesinger found the principal branch of the right portal vein occluded.

In all the cases hitherto recorded, the principal tumor has been situated in the right lobe of the liver. The corresponding portion of the external capsule has always been thickened and cartilaginous, and adherent to the surrounding parts. The remaining portion of the parenchyma of the liver has been jaundiced, and in Griesinger's case it was hypertrophied.

3. *Complications.*

In addition to the hepatic disease, the spleen has always been found enlarged. In the cases recorded by Zeller and Griesinger its size was increased threefold. In Virchow's case, the spleen contained a small mass of extravasated blood.

In every case, there has been serous or purulent effusion in the abdominal cavity.

4. *Etiology.*

There can be no doubt, that the new-formation under consideration belongs to the echinococci, and that it owes its origin to the immigration of the ova of a tapeworm into the liver. The only doubtful point, is the cause which gives rise to the peculiar form of development, resulting in the formation of such numberless hydatids, growing close to one another. Is it any peculiarity inherent in the germ, or is the large number of hydatids developed by sprouting and cleavage from comparatively small tapeworm embryos? Virchow, from the peculiar arrangement of the tumor examined by him, and of those observed by Buhl and Dittrich, concludes that this form of echinococcus has its seat in the lymphatic vessels of the liver, and attributes the extension of the cysts in certain directions, as well as their small size, to the resistance offered by the lymphatic walls. This view is supported by Küchenmeister (*op. ant. cit.*, p. 478), who endeavors to account for the large number of hydatids by a subdivision of the parent cysts growing within the lymphatic vessels. The subject requires further investigation, before it can be regarded as definitely settled.

All the cases, hitherto observed, have occurred in individuals between the ages of 30 and 45.

5. *Symptoms.*

The symptoms of the multilocular hydatid of the liver differ in many respects from those of the simple hydatid. On palpation, the swelling of the liver is found to present a cartilaginous hardness; while in most cases it is nodulated and tender upon pressure. The smooth surface and the hydatid vibration of the simple echinococcus are not met with here. Fluctuation is either absent or only makes its appearance at an advanced stage.[1] In all the cases, which as yet have come under notice, there has been enlargement of the spleen, together with serous or purulent effusion into the peritoneal cavity, and intense, obstinate jaundice,—prominent symptoms, which are of rare occurrence in the case of the common hydatid, but which are met with here in consequence of the implication of the vessels and bile-ducts of the liver. A long duration and tedious progress are common to both forms of disease. In the case recorded by Zeller and Luschka, the disease lasted several years; the duration of the disease in Griesinger's case was eleven years; in other cases, however, such as those recorded by Buhl and Virchow, the disease has terminated fatally within three or four months after it was first recognized. In consequence of the suppuration in the centre, this tumor produces more disastrous consequences upon the general constitution, than the ordinary hydatid.

6. *Diagnosis.*

A diagnosis of the disease during life, must necessarily be difficult. The hardness of the tumor, its nodulated and painful character, and the presence of ascites and enlargement of the spleen, would render it very difficult to distinguish between this form of echinococcus and cancer, or a cirrhotic, waxy liver, unless the supposition of cancer were excluded by the long duration of the disease, and that of cirrhosis and waxy liver by the absence of the causes upon which these affections usually depend. When fluctuation can be discovered in the tumor, in consequence of internal suppuration, it is liable to be confounded with the simple hydatid; under such circumstances, puncture would yield a purulent fluid, similar to that which is found in an ordinary hydatid undergoing disintegration; the presence, however, in the fluid of numberless small, gelatinous vesicles in conjunction with the existence of jaundice, enlargement of the spleen, ascites, and the nodulated, painful character of the tumor itself, might reveal the real nature of the case.

7. *Mode of Termination.*

Past experience shows that the disease always terminates fatally. It is still uncertain whether a retrograde metamorphosis and cure are possible.

8. *Treatment.*

The treatment is restricted to the relief of symptoms. Puncture of the tumor, which may suggest itself, when fluctuation is observed, can only aggravate the hectic fever, and cannot bring about closure of the cavity or lead to recovery.

VI. PENTASTOMA DENTICULATUM.

The pentastoma is a parasite, which has only recently been discovered in the human subject; but it is, nevertheless, far more common in the human liver than the echinococcus. It is devoid of clinical importance, because it does not give rise to any functional derangements. Pruner (*Krankheit des Orients*, 1847, s. 245) was the first who pointed out the existence of the pentastoma in the human liver. On two occasions, he found an encysted parasite in the liver of negroes at Cairo, the nature of which, however, he did not accurately determine. Bilharz and Von Siebold (*Zeitschrift f. wissensch. Zoologie*, Bd. IV., s. 63) recognized in it a new variety of pentastoma, to which they gave the name Pentastoma constrictum. In Germany the pentastoma was first found in the human liver by Zenker (*Zeitschrift f. ration. Medic.*, 1854, Bd. V., s. 224); it occurs, however, not only in this gland, but also in the kidneys, and in the submucous tissue of the small intestine. (Wagner.) The parasite is by no means rare with us. Zenker, at Dresden, succeeded in finding it 9 times out of 168 autopsies;[1] Heschl, at Vienna, met with it 5 times out of 20 autopsies; Wagner at Leipzig, once in 10. According to Virchow, it is more common in Berlin than in central Germany. During six months at Breslau, I met with it in 5 out of 47 dead bodies. The Pentastoma endemic in Germany is not identical with that which occurs in Egypt; the former is the Pentastoma denticulatum of Rudolphi.

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[1] In Griesinger's case only, was fluctuation perceptible in the tumor during life.

This parasite is found in the liver, and in most cases on the upper surface of the left lobe; more rarely, it is seen in the right lobe, and then it is usually close to the suspensory ligament; it is also occasionally seen on the under surface. but it is scarcely ever observed in the interior of the gland. In the above situations it presents the form of a somewhat prominent nodule, from 1 to 1½ line in length, which is formed by a firm, fibrous capsule, easily detached from the surrounding parts. As a rule, there is only one present; in rare cases there are two or three. The animal lies coiled up in the interior of this capsule. It is from 1 to 1½ line in length, and is coated with calcareous matter, and so firmly adherent to its case, that it is a difficult matter to liberate it unhurt. By employing dilute hydrochloric acid, we can remove the calcareous salts, and then we are enabled to study the parasite more carefully.

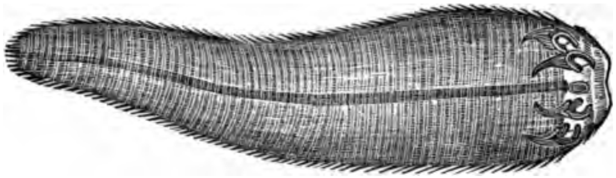

FIG. 10.—Pentastoma denticulatum, copied from *Atlas*.

The skin is of a somewhat brownish color, and is covered by transverse parallel rows of prickles, running round the body in the form of rings. In each row, there are about 160 small, pointed prickles, directed backwards, and measuring from 0·02 to 0·03 millimètres (about $\frac{1}{850}$ to $\frac{1}{600}$ Eng. inch) in length. At both margins of the tongue-shaped animal, a series of openings, the so-called spiracles, or stigmata respiratoria, may be observed. Immediately beneath the truncated head extremity lies the small oval mouth, which is surrounded by a thin yellowish rim of chitine.[2] In a line passing outwards from each side of the mouth, there is a pair of large, yellowish, much-curved hooks, with a broad-jointed base in a little pouch-like depression. Each hook is provided with a peculiar supporting apparatus, to which it is jointed. The supporting apparatus appears to be formed by the lining membrane of the hook-pouch converted into chitine. The upper end of the supporting apparatus is drawn out into a point, which has been designated by Küchenmeister "the 'point-cover,'" (*Spitzendecker*). The anus is situated at the caudal extremity of the animal.

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[1] Küchenmeister says that Zenker met with the pentastoma 30 times in 200 autopsies. Küchenmeister on Human Parasites, *Syd. Soc. Transl.*, Vol. II., p. 12.—TRANSL.

[2] Chitine is a peculiar principle, intermediate between the albuminous principles on the one hand, and the carbo-hydrogens on the other. It is an admitted member of the starch series, but it differs from the other substances belonging to this class in containing nitrogen, and in not being converted into sugar when boiled with dilute acids. —TRANSL.

As was imagined by Gurlt and Leuckart (*Bau und Entwickelungsgeschichte der Pentastomen*, Leipzig, 1860), the pentastoma denticulatum has been proved by experiment to be merely the immature pentastoma tænioides, which is parasitic in the nostrils and frontal sinuses of the dog and other animals. The pentastoma denticulatum is not uncommon in the animal kingdom, being found in goats, rabbits, bullocks, cats and other animals.

How it gains admittance into the human body has not yet been ascertained. Its ordinary situation on the outer surface of the liver appears to indicate that it enters the stomach with the food, and that then it forces its way through the wall of this organ to the left lobe of the liver, where it attaches itself beneath the peritoneal covering, becomes encysted, and soon afterwards perishes.[1]

VII. CANCER OF THE LIVER.

(*Carcinoma Hepatis.*)

1. *Historical Account.*

Before the commencement of the present century, cancer of the liver was nowhere strictly defined from other tumors and degenerations of the gland. It is true, that cancer of the external organs, and more especially of the mammæ, had been known since the time of Hippocrates; but the occurrence of cancer, and the characters presented by it in the internal organs, where it does not give rise to ulcerative destruction of the tissues, still remained, for the most part, unrecognized.

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[1] It may be mentioned that the Pentastoma, or Linguatula, though an internal parasite, does not belong to the Entozoa, properly so-called. This was first pointed out by Schubert (*Zeitschr. für wiss. Zool.*, 1852, s. 117), and subsequently by Van Beneden. These observers ascertained that the embryo, on quitting the egg, is provided with two pairs of feet, each of which has two claws at its extremity; and from this, as well as from other structural peculiarities, it was determined to place the Pentastomes among the Crustacea, near the genus *Acarus*. It seems probable, that the *Pentastoma denticulatum* first gains access to the human body, and to that of the lower animals, in the condition of the egg. The extremely minute embryo, escaping from the shell, bores its way among the tissues, and after a short time assumes the larval state, becomes encysted, and finally degenerates; but if the ovum gain admission into the body of a carnivorous animal, the embryo escapes from the ruptured capsule, and finds its way into the nasal passages, where it is further developed, and becomes converted into the *Pentastoma tænioides*. The *Pentastoma denticulatum* is most common in Ruminants. My friend Dr. Cobbold, who has repeated Professor Leuckart's experiments, found the *Pentastoma denticulatum* remarkably abundant in the lungs and abdominal viscera of the Bubale (*Antilope bubalis*) and Pigmy Antelopes (*Cephalophus pygmæus*). For additional information concerning the Pentastoma, I may refer to Dr. Cobbold's writings (*Linnæan Transactions*, Vol. XXIII., p. 261; and *Proceedings of Zoological Society of London* for March 26th, 1861).—TRANSL.

Under the term *scirrhus hepatis*, every form of induration of the liver was formerly included—the simple and the granular induration, as well as true cancer, into which these last were thought to degenerate under unfavorable circumstances. This disease (scirrhus) was regarded as one of the consequences of hepatitis, and afterwards it was included in the extensive class of hepatic obstructions. We find this view long ago expressed by Galen (*Method. Medendi*, Lib. II. Cap. VII., *ad Glaucum*), and Aretæus (*De Causis et Signis Morborum Diuturnorum*, Lib. I. Cap. XIII., p. 42.) "Verum si a phlegmone hepar non suppuratur, nemini dubium fuerit, tumorem durum subsidentem in scirrhum mutari ac stabiliri," &c. Bianchi (*Historia Hepatica*, Lib. I., p. 336) observes:—"Pertinatior hepatis frigida sive lymphatica obstructio, præsertim post diuturnos in rebus naturalibus errores quandoque in scirrhum convertitur, cum pituitosus humor in volumen inertius indurescit." Similar opinions were held by Fr. Hoffmann[1] (*Dissertatio Medica de Hepatis Scirrho*, 1722. *Opera Omnia*, Suppl. II., p. 357), and likewise by Boerhaave and Van Swieten (*Commentar. in Hermanni Boerhaave Aphorismos*, Lib. III., p. 117 *et seq.*) "Atque rursum si post inflammationem jecinoris adsunt conditiones, scirrhus ibi nascitur, qui tumore, duritie, incremento et suam sedem et vicina lædit; mollibus non auscultat, acribus in cancrum horrendum vertitur," &c. Morgagni gave a very accurate description of several cases of cancer of the liver, not, however, under the designation of Cancer, but sometimes under that of Steatoma, and at other times of Hard Tumors. Thus, in Epistola XXX., p. 14, we find:—"Abdomine diducto, jecur longe maximum inventum est, steatomatibus plenum. Ventriculus intus fuit nigris maculis distinctus, in pyloro callosus;" and again, in Epistola XXXVIII., p. 28:—"Venter, ubi exhausta fuit effusa aqua, jecur ostendit multis albis nec tamen perduris tumoribus intus extraque obsessum, in pancreate autem similem unum sed duriorem." In the former case, the disease of the liver was complicated with cancer of the stomach, and in the latter with cancer of the pancreas. Analogous observations are to be found in the writings of Ruysch (*Observat. Anat. Chirurg.* pp. 45 et 86), Stoll (*Ratio Medendi*, Tom. III., p. 1), and other authors.

Matthew Baillie (*The Morbid Anatomy of the important Parts of the Human Body.* German Edition, with notes by Sœmmering, 1794, p. 130) figured and carefully described cancer of the liver, under the term "Large White Tubercles," or nodes, the resemblance of which to scirrhus in other parts of the body did not escape him. Among the tubercles of the liver, however, he likewise included cirrhosis under the term "Common Tubercles of the Liver," and likewise tubercles properly so called, under the term "Scrofulous Tubercles;" and lastly, certain soft, brown tubercles, the real nature of which is not very evident. This obscurity in reference to cancer of the liver is even found in Portal's work (*Maladies du Foie*, Paris, 1813); this author nowhere describes it as a peculiar form of disease of the liver, but only alludes to it occasionally and superficially, as one of the various results of hepatitis. For example, he observes: "On a vu par ces observations, que la suppuration, l'induration ou le squirrhe, le cancer, le gangrène ou le sphacèle etaient des terminaisons frequentes de l'inflammation du foie."

Bayle (*Dictionn. des Sciences Médicales*, art. *Cancer.* Paris, 1812), was the first to give an accurate description of cancer of the liver, and to demonstrate the frequency of its occurrence. He first pointed out that the tumors of the liver, before described under the terms steatoma, white bodies, tubercles, scirrhus, &c., were true cancer, inasmuch as their anatomical structure was identical with that of cancer of the breast, and because they underwent the same changes, coexisted with cancer in other organs, and produced the same injurious consequences upon the general system.

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[1] Fr. Hoffmann annexed to his description of *Scirrhus Hepatis* the history of a case, which was ultimately cured, after the bursting of a hepatic abscess through the abdominal parietes.

From that time up to the present, numerous excellent works have appeared,[1] by means of which the clinical history of cancer of the liver, its minute structure, its mode of development and retrograde metamorphosis, its various forms and symptoms have been gradually more and more accurately determined.

2. *Anatomical Description.*

Carcinoma of the liver, as a rule, presents the characters of ordinary simple cancer, and, according to the extent of development of the fibrous element and the amount of cancer juice, belongs at one time to the scirrhous, and at another to the medullary, variety. Much more rarely, we find the cancerous tissue infiltrated with pigment or abounding in blood-vessels, constituting *Carcinoma melanodes* and *Carcinoma telangiectodes;* and still more rarely we meet with examples of the cystic cancer, or even of true colloid cancer.

In exceptional cases, morbid growths are met with in the liver, which in every respect resemble sarcomatous tumors. (*Sarcomen.*)

Cancer usually takes the form of isolated tubercles or nodules embedded in the hepatic parenchyma. Less frequently, extensive portions of the hepatic tissue are infiltrated with cancerous matter, without any definite line of demarcation. English writers distinguish these two forms by the terms *Tubera circumstricta* and *Tubera diffusa;* French observers designate them, *Tubercules cancéreux* and *Tumeurs cancéreuses disséminées.*

The size of the nodules may vary from that of a millet-seed to that of an apple, or even of a child's head. Their form in most cases is rounded; it is only when they reach the outer peritoneal covering, that they appear flattened, or in many cases depressed and umbilicated, the peritoneum at such places being opaque and thickened. There may be one or several of these nodules; sometimes they are distributed in large numbers throughout the hepatic tissue, on the outer surface, as well as in the interior of the organ. The larger their size, the smaller is their number. They are usually numerous, when the hepatic cancer is secondary to morbid growths of the same nature in other organs; while, as primary growths, they are more commonly isolated. A large cancerous tumor is often found accompanied by numerous smaller ones, which apparently are of more recent date.

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[1] The most important of these works are the following:—

Cruveilhier, *Anatom. Pathol.*, Livr. XII., Pl. ii. and iii.; Livr. XXII., Pl. i.; Livr. XXVII., Pl. v.; Livr. XXXVII., Pl. iv.

Andral, *Clinique Médicale*, Tom. IV., p. 188. *Anat. Pathol.*, T. II., p. 604.

Abercrombie, *Researches on Diseases of the Stomach, the Intestinal Canal, the Liver, &c.*, 1828.

Farre (J. R.), *Morbid Anatomy of the Liver*, 1815.

Bright (R.), *Guy's Hospital Reports*, Vol. I., 1836.

Hope (James), *Principles and Illustrations of Morbid Anatomy*, 8vo., 1834, Figs. 90 to 100.

Carswell, *Pathological Anatomy*, Fasc. II., Pl. iv.; Fasc. IV., Pl. i.

Budd, *Diseases of the Liver.* London, 1854.

Rokitansky, *Pathol. Anat.*, Bd. II., s. 354.

Oppolzer, *Prager Vierteljahrschrift*, 1854, s. 59.

Bochdalek, *ibid.*, 1845 and 1846.

Dittrich, *ibid.*, 1846 and 1848.

Waller, *Zeitschr. der Wiener Aerzte*, 1846.

Lebert, *Anatom. Pathol.;* &c., &c.

The substance of hepatic cancer is usually of lardaceous (*speckartig*) consistence; in rare cases the mass is hard and cartilaginous, or sometimes, on the other hand, soft, brain-like, and almost fluctuating.[1] Its surface, on section, usually presents a dull-white color, interspersed with a greater or less number of red dots and streaks, according to the degree of vascularity of the mass. On pressure, a milky juice exudes from the cut surface, which is always more abundant in proportion as the cancerous substance is soft and medullary. After squeezing out the juice, the meshes of the fibrous framework of the cancerous tissue are distinctly visible.

The circumference of the cancerous nodules is rarely bounded externally by a well-defined cyst:[2] more frequently, the morbid growth passes insensibly into the surrounding glandular tissue. This arrangement, as well as the general relations of the glandular elements to the cancer, is best seen by carefully examining fine sections of the tumor under a high magnifying power.[3]

In the development of carcinoma hepatis, the cancerous tissue is substituted for the hepatic cells, the morbid change in most cases originating in the interlobular connective tissue. No compression of the lobules is observed, such as occurs in the case of hydatids and other morbid growths.[4]

At the same time that the cancerous matter is deposited, the vascular apparatus at the diseased places undergoes important changes. In proportion as the interlobular tissue increases, the branches of the hepatic artery become more prominent, while those of the portal vein are to a corresponding degree diminished.[1] Only isolated branches of the portal vein penetrate into the cancerous mass, but large branches of the hepatic artery permeate its fibrous framework. Everywhere that the hepatic cells are replaced by the cancerous elements, the capillary network formed by the portal and hepatic veins disappears, whilst a new vascular apparatus of abnormal arrangement is formed by the branches of the hepatic artery.[2] The number of these vessels varies greatly; in the milk-white tumor it is often very small; but sometimes, and particularly in the soft cancers, the vessels are aggregated together in such large numbers, that the morbid growth presents a dark-red hue. The walls of these vessels are usually thin, like those of capillaries, notwithstanding their size, and hence they are easily torn, and give rise to hæmorrhages, which, in most cases, are limited to the cancerous mass, but occasionally escape into the peritoneum, in consequence of rupture of the capsule of the liver.

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[1] Cruveilhier has described as cancerous abscesses, fluctuating tumors of the liver, which, when punctured, discharged a creamy fluid, and which were bounded externally by a cyst, traversed by trabeculæ. They were developed in consequence of primary cancer of the uterus.

[2] It is in the soft medullary cancer of the liver that I have chiefly met with a well-developed capsule, from which the cancerous matter could be torn out without injuring the surrounding parts, or be washed out with water. Wardrop, Læennec, Bright (*Guy's Hospital Reports*, Vol. I., p. 638), Schroeder van der Kolk (Backer, *De hepatis Structura*, 1845, p. 59); and likewise Rokitansky (*Path. Anat.*, Bd. VII., s. 358), have recorded similar observations. In one of the cases figured by Bright, a single large vessel passed into the tumor, the capsule itself had a reticulated appearance, and the surrounding hepatic tissue was condensed. In another case, compressed flattened vessels were observed upon the smooth capsule. Similar cases have been reported by Cruveilhier.

[3] In many cases it is difficult to determine whether we have to do with fatty hepatic cells or fatty cancer cells, when the pigment contents of the former cannot be detected.

[4] Compression and condensation of the surrounding hepatic substance are only observed in a few rare cases of encysted cancer. That hepatic cancer commences in most cases in the interlobular connective tissue, has already been recognized by Hodgkin and Bright (*Guy's Hospital Reports*, Vol. I., p. 639); and likewise by Schroeder van der Kolk. Walshe, on the other hand, has erroneously referred the site of commencement to the interior of the lobules. I have occasionally observed in the centre of a few of the lobules,—a gray granular substance, surrounded by hepatic cells, which were in part still normal and accompanied by portal capillaries, but some of which, on the other hand, appeared spindle-shaped and atrophied, and imbedded in a fibrous stroma. This appearance, however, is rarer than that above described.

The apoplectic masses of cancer of the liver undergo subsequent changes in color, similar to those which are observed in the case of extravasations into other parenchymatous tissues.

Copious hæmorrhages into the interior of an hepatic cancer, give rise to a remarkably rapid increase in its volume, and sometimes likewise occasion symptoms of anæmia.

When the cancer bursts through the peritoneal envelope of the liver, hæmorrhages may ensue, which prove fatal in a few hours from loss of blood. (See Observation No. XI.) Farre (*op. cit.*, p. 43), and likewise Cruveilhier (*Anat. Pathol.*, Lib. XXXVII., p. 4), each record a similar case.

The changes which the vascular apparatus of the liver after a length of time undergoes, have not yet been sufficiently investigated. After the supervention of fatty degeneration and softening, I have seen the substances injected into the vessels become everywhere extravasated into the hollow spaces filled with soft matter, while in the firmer portions of the tumor the capillaries were distinctly visible. It is more than probable that the vessels in the cancerous deposits participate in other forms of retrograde metamorphosis. In portions which had undergone atrophy, I have repeatedly seen obsolete vascular twigs loaded with pigment, imbedded in the fibrous stroma.

Of the vessels originally present in the portions of liver affected with cancer, the larger branches of the portal vein sometimes remain for a long period intact, permeating the tumor, with their channel free, and their walls sound; more frequently they are flattened, or compressed in an angular manner; while it not unfrequently happens that they become filled up and obstructed by cancerous matter. J. F. Meckel (*Handbuch der Pathol. Anat.*, Bd. II., s. 322); Otto (*Lehrbuch der Path. Anat.*, 1830, Bd. I., s. 359), and more recently, Cruveilhier (*Anat. Pathol.*, Livr. XII., p. 6), Schroeder van der Kolk (*Backer, De Structura Hepatis*, p. 66), Rokitansky, and others, have published more or less accurate descriptions of this affection of the portal vein; five cases have come under my own observation. Cancer of the portal vein, as a rule, originates from cancerous deposit in the liver, which attacks the venous wall, and grows from without into the interior of the vessel. The wall of the vessel becomes thickened, undergoes degeneration, and sends growths, attached by a broad or narrow base, into the interior of the vein, which fill it up either partially or entirely. Sometimes a branch of the portal vein undergoes degeneration all round in the form of a ring, and is obliterated by the cancerous mass closing it up. The morbid growth extends from the site of the disease along the channel of the vein, and gradually fills up extensive tracts of this vessel, as far as its capillary branches. The tumors growing from the wall of the vessel, which at first are smooth and covered by the lining membranes of the vessel, but afterwards burst through this membrane, sooner or later give rise to hæmorrhages, which in a short space of time produce extensive thromboses, with corresponding obstruction of the circulation.

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[1] In the case of large or multiple hepatic cancers, the trunk of the hepatic artery is also considerably enlarged. To form an idea of the relation of the vessels, one ought to compare the appearances presented by them in injected preparations.

[2] The statements of different observers respecting the vascular apparatus of cancer are very various. Whilst Cruveilhier referred the seat of hepatic cancer to the venous capillaries, and Thomas Meyer (*Carcinome der Leber*, Basel, 1843, s. 20) regarded the portal vein as the starting-point of the morbid growth, Schroeder van der Kolk (*Observationes Anatomico-Pathologicæ*, 1826, Fasc. I., p. 46) and Berard (Cruveilhier, *Anat. Pathol.*, Livr. XII., p. 6), relying upon the results of injection, have denied entirely the participation of the veins. I have examined a large number of hepatic cancers, which were injected from all three vascular trunks, and have found none but large branches of the portal vein close to, or passing through, the tumor, but no capillary ramifications of this vessel; the morbid growth has always been supplied with its vessels by the hepatic artery, which has been the only vessel injected as far as its capillaries.

Cancer of the portal vein is not, however, invariably produced by a cancer in the adjacent portion of the liver growing into the vessel. There are cases where simple thrombi of the veins contain the elements of cancer, in addition to the ordinary constituents of old blood coagula, without there being any indication of a rupture of the venous coats, and where it can only be supposed that cancer cells have been developed in the thrombus itself. Cases of this nature have been designated cancerous phlebitis. (See Rokitansky, *Pathol. Anat.*, Bd. II., s. 651:[1] H. Meyer, *Zeitschrift f. ration. Medicin, neue Folge*, Bd. III., s. 136; Virchow, *Gesammelte Abhandl.*, s. 155, and lastly, Observation No. X. of this volume.)

The cancerous growth sometimes entirely fills up the trunk and branches of the portal vein throughout their entire extent, but more frequently we find only isolated branches or twigs blocked up. The calibre of the vessel, at the diseased places, is in most cases uniformly, or irregularly, enlarged.

It is remarkable, that the branches of the hepatic veins usually remain exempt from cancerous infiltration,—a fact which has likewise been noticed by Cruveilhier and Schroeder van der Kolk, and which the latter of these observers has endeavored to account for by the larger number of arteries contained in the capsule of Glisson, enveloping the portal vein. I have, however, observed simple coagula of blood in the hepatic veins where they were compressed by the cancerous deposit. In some cases the vena cava undergoes compression. (See Observation No. XV.)

Next, to the portal vein, the lymphatic ducts and glands are not unfrequently implicated in cancer of the liver. The lymphatic glands in the fissure of the liver are particularly liable to become enlarged, and infiltrated with cancerous matter, often to such an extent, as to compress the adjoining bile-ducts, and obstruct the excretion of bile.

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[1] *Syd. Soc. Transl.*, Vol. IV., p. 360.—TRANSL.

In two instances I have seen the lymphatic ducts filled with gray medullary cancer, and resembling knotted cords, almost as large as a crow-quill, running backwards over the upper surface of the liver, from cancerous nodules at its anterior margin; the glands of the mediastinum in these cases were enlarged. (See Observation No. XXI.) In other cases, I have succeeded in tracing the cords from the transverse fissure into the hepato-duodenal ligament, and from the portal vein downwards behind the pancreas and pylorus to the cœliac glands. The extension of the disease was here in a direction contrary to the current of the chyle.

Cancer of the liver may produce various effects upon the bile-ducts. The smaller ducts are compressed, and, like the hepatic cells, disappear without leaving any trace behind. The larger ducts are compressed, and their walls are thickened, while at some places dilatations are formed, which may rupture and cause extravasation of bile into the surrounding cancerous tissue.[1] Large ducts not unfrequently pass unchanged through the cancer; but sometimes, and particularly in the case of the hepatic and cystic ducts, round, flattened cancerous nodules are developed beneath the mucous membrane, which obstruct the free current of the bile.

These changes in the bile-ducts, with the accompanying catarrhal condition of their lining membrane, account for the frequent occurrence of jaundice and gall-stones in cases of cancer of the liver.

When the cancerous deposits are situated at the surface of the liver, the serous covering of the organ is in many cases involved in the disease. It becomes white and thickened at those places where it passes over the cancerous nodules, and particularly where these nodules present a cicatrix-like depression. Sometimes chronic peritonitis is developed, which rarely becomes general, but in most cases is restricted to the liver, and induces adhesions between it and the neighboring organs, forming in this way bridge-like processes for the further extension of the cancer. Very frequently cancerous deposits are developed upon the peritoneal surface, in the form of round, tubercle-like nodules, or of broad flat plates. These deposits are chiefly found in the neighborhood of the liver, but may be developed in every direction, as far as the peritoneum extends.

From the convex surface of the liver, the disease may extend, so as to implicate the diaphragm and right pleura. Cruveilhier has seen death result from chronic pleurisy which had originated in this way. (See also Observation No. IX.)

General peritonitis usually gives rise to serous effusions with a small quantity of fibrinous flakes. It is only in exceptional cases, that purulent peritonitis is developed in connection with soft, rapidly-growing cancers, which are accompanied by intense congestion of the liver.

The growth of cancer advances rapidly or slowly according to its character. Soft cancers, abounding in juice, may increase in size very rapidly, whereas hard scirrhous cancers increase but slowly. Farre (*op. cit.*, p. 28), mentions a case where the increase which a cancer of the liver had undergone in five days, was estimated at five pounds. Careful observation of patients shows that the increase, in most cases, takes place by fits and starts, periods of apparent repose alternating with others, in which the nodules are painful and grow rapidly.

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[1] Bright has figured such aneurismal dilatations of the bile ducts. (*Guy's Hospital Reports*, Vol. I., p. 651).

The developmen of cancer in the liver, as is the case in every other part of the body where the disease is met with, is limited; whenever the disease has existed for a long time, it is found to exhibit traces of decay and retrograde metamorphosis. These changes consist in fatty degeneration, as well as atrophy and shrivelling of the cancer. The cells lying in the meshes of the fibrous stroma become filled with oil globules, and present a white, opaque appearance, imparting to the morbid growth a reticulated aspect, or nodulated masses are formed, by large groups of cells at one place becoming atrophied. The fatty cells may ultimately become disintegrated into an emulsive fluid, which gradually undergoes absorption. At those places where this happens, and they are mostly the central portions of the tumors, the fibres of the reticulated stroma are densely aggregated, the meshes become smaller, and ultimately there remains only a firm, cicatrix-like tissue, from which no cancer juice can be pressed out.

The outer surface of the cancerous nodule is drawn in, and depressed, in an umbilicated manner, owing to the contractile fibrous tissue gradually becoming more and more shortened. A section made through a depressed nodule of cancer of the liver presents the following appearances:—In the centre of the nodule an umbilicated depression is observed, and beneath this the fibres of the reticulated stroma are closely compressed; the meshes at this place are contracted and partly destroyed, whilst those towards the periphery of the nodule are large and filled with cancer cells. These appearances are represented in the annexed woodcut (Fig. 11).

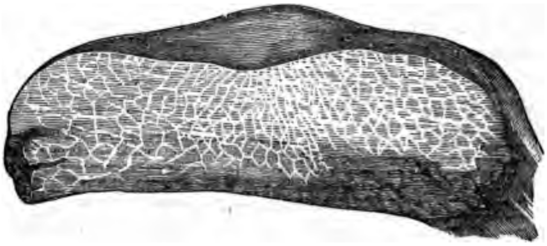

FIG. 11.—Section through an umbilicated cancerous nodule, projecting from the surface of the liver. The meshes found by the fibrous stroma are represented as becoming gradually smaller towards the central depression.

These changes have been regarded as indications of the commencement of cicatrization and cure of hepatic cancer. Oppolzer and Bochdalek (*Prager Vierteljahrschrift*, 1845, Bd. II.) have published observations of cases, in which they believe they have traced, both clinically and anatomically, the process of spontaneous cure of cancer of the liver. There can be no doubt, that the condensation and shrivelling of the cancerous nodules just described are, in many cases,[1] to be looked upon as a local retrograde metamorphosis, or, if one prefers the term, as the commencement of cicatrization; but this process is very different from an actual cure of the cancerous disease. Together with the retrograde change going on in the centre of the cancerous nodule, a progressive development is observed at the circumference, which proves that the morbid process is not extinguished, but only locally destroyed. I have never met with an instance of real cure of cancer of the liver, either in practice or on the *post-mortem* table. Even the cases recorded by Oppolzer and Bochdalek admit of another interpretation; the mistake of these writers arose from their confounding with carcinoma, the syphilitic cicatrices of the liver described in Vol. II., page 160.

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[1] The umbilicated depression on the outer surface of hepatic cancer is not always produced in the manner above mentioned. It is often observed in young nodules, in which no appearance of retrograde metamorphosis can be detected. I attribute the appearance, under such circumstances, to the greater contractility of the older connective tissue of the central portions of the nodules, and to the diminution of the cancer juice, in consequence of the supply of blood being lessened by the growth going on at the circumference.

In addition to the partial atrophy of hepatic cancer, two other changes are met with, which, however, are comparatively rare, namely, softening and inflammation. In the former case, hollow spaces are formed in the interior of the cancer, which are filled with a fluid containing oil globules, granules, and the debris of the fibrous stroma. (See Observations No. XI. and No. XIII.) Not unfrequently it happens, that the cancerous masses become infiltrated with a purulent exudation, as in the cases recorded by Cruveilhier (*Anat. Patholog.*, Livr. XXXVII., Pl. 4, p. 2), and Bennett (*Cancerous and Cancroid Growths*, Edinburgh, 1849, p. 39).

The hepatic parenchyma, which is not implicated in the cancer, does not always present the same characters. Usually it undergoes no change, or is only altered to such an extent, that the entire mass of the glandular substance, which remains after removal of the cancerous nodules, has undergone a diminution in volume, in many cases of considerable extent. The glandular tissue may be atrophied to one-third, or even to one-seventh of its original size. After removing the cancerous nodules from the liver of a man, 43 years of age, I found the organ to weigh only 0·31 kilogramme (11 oz. avoird.). In other cases, the nutrition of the glandular tissue is increased, and hypertrophy is the result, so that, after abstracting the cancer, the size and weight of the liver are increased, and occasionally even doubled. This increase is chiefly observed in the case of soft, rapidly-growing medullary cancers, attended by great congestion.

The secreting tissue at the circumference of the nodules is frequently in a state of fatty degeneration, and in some cases it is condensed and intermixed with fibrous tissue. Those parts where the supply of blood has been cut off for a long time, owing to obliteration of branches of the portal vein, undergo local atrophy. Occlusion of the larger bile-ducts by the cancer, imparts a yellow or olive-green color to the glandular tissue, and gives rise to all the ordinary consequences of obstruction to the flow of bile. Cirrhotic degeneration is a rare accompaniment of cancer (see Observation No. VIII.); more frequently Glisson's capsule is found thickened, or in a state of simple hypertrophy, or of cancerous degeneration. (See Observations No. XVIII. and No. XIX.)

In addition to the two ordinary varieties of cancer (scirrhous and medullary), other forms of the disease are met with in the liver, the structure of which differs in many respects from that above described. To these belong fungus hæmatodes, melanotic cancer, cystic cancer, and the alveolar or colloid cancer.

a. *Fungus Hæmatodes.*

(*Der Gefässkrebs, Blutschwamm, Carcinoma Telangiectodes.*)

This form of cancer is distinguished by the abundance of blood-vessels, which are large and furnished with thin walls, so that they are easily torn, and give rise to apoplectic extravasations, as already described. From this we must distinguish the rare cases figured by Farre (*op. cit.*, Plate IV.), and Cruveilhier[1] (*Anat. Pathol.*, Livr. XII., Pl. 2 and 3), in which certain portions of the cancer consisted of erectile tissue, similar to that of a cavernous tumor. These are, in truth, combinations of two sorts of tumor, whose development agrees in many points, as has already been pointed out.

b. *Melanotic Cancer.*

(*Carcinoma melanodes.*)

In this case, a number of small nodules are disseminated through the liver, which are partly pale and partly colored with yellow, brown, or black pigment, and which present an irregular form, and in most cases an ill-defined outline. The organ acquires in consequence an appearance like that of granite.

The pigment is deposited, for the most part, in the interior of the cancer cells, but partly exists in the form of isolated or aggregated granules floating free in the cancer juice. This form of cancer is characterized by rapid growth and extension.

The structure of morbid growths in the liver, which contain pigment, does not always coincide with that of cancer. Observation No. X. gives the details of a case, for which I am indebted to the kindness of my colleague, Lebert. It is remarkable, inasmuch as the elements of the tumor consisted entirely of spindle-shaped cells, partly pale, and partly loaded with pigment, which in their form resembled those of a sarcomatous tumor.

c. *Cystic Cancer.*

(*Carcinoma cysticum.*)

In this form of the disease, rounded cavities, from the size of a pea to that of a walnut, filled with a clear serous fluid, and lined by a smooth serous-looking membrane, are found in the interior of the cancerous nodules. Not unfrequently the boundary of the cavities is indistinct, the serous membrane is absent, and the contents consist of a mucous, viscid fluid.

d. *Alveolar or Colloid Cancer.*

(*Carcinoma alveolare.*)

True alveolar cancer is rarely met with in the liver, and has only been carefully observed in a few instances.[2] I have only once had the opportunity of examining it. The case in question was that of a man, 42 years of age, who was admitted into my Clinique at Breslau on 19th of July, 1856, in a state of great exhaustion, with enlargement of the spleen, and symptoms of pneumonia of the left lung, and who died on the day following admission. In addition to great hepatization of the left lung, and very extensive enlargement of the spleen, a rather large, rounded tumor, with an umbilicated depression on its outer surface, was found in the left lobe of the liver, close to the suspensory ligament. On section, it presented a grayish-white, reticulated fibrous stroma, which passed outwards in a radiated manner from an obliterated branch of the portal vein, and towards its circumference presented an areolar structure, at one place with small, and at another, with large meshes. The larger meshes were filled with a hyaline, gelatinous, homogeneous substance, which, when squeezed out, was perfectly diffluent. Under the microscope, elongated nuclei were discovered, most of which contained oil globules, and were situated between the fibres of the reticulated stroma, but some of which were arranged in a concentric manner in the gelatinous substance. Here and there, especially at those places where the fibrous framework, which by the way closely resembled that of the lung, was most dense, rounded nuclei and cells were observed, some of the cells enclosing a single nucleus, and others several nuclei, many of which contained oily matter. Some of the cells had a club-shaped form, were filled with oil globules, and contained a hyaline globule in place of a nucleus.

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[1] Plusieurs masses cancéreuses, offraient, dans une partie de leur étendue, une trame érectile tout-à-fait analogue au tissu du corps caverneux ; cette trame était remplie par un liquide couleur lie de vin.

[2] With regard to some of the recorded observations, it is doubtful whether they ought to be recorded under this head, or under that of the multiple echinococci. This remark applies to the cases in the Prague Museum (Dittrich, *Prager Vierteljahrsschrift*, 1848, Bd. III., s. 117), those in the Museum at Zurich (Meyer), and those in Guy's Hospital (S. Wilks, *Transactions of the Pathological Society*, Vol. X.). Böttcher

The glandular tissue of the liver, the amount of which was greater than in the normal state, presented enlarged lobules, the secreting cells of which were loaded partly with oil and partly with pigment.

The coats of the cæcum were diseased in a similar manner to the liver. They were infiltrated with colloid cancer, which in appearance and structure precisely resembled what has just been described. Here, however, the consistence of the gelatinous substance was greater, so that when squeezed out, it retained the form of the alveoli, and resembled elastic globules.

Luschka's observation referred to a colloid cancer of the liver, which had extended to the stomach, the transverse colon and the omentum (*Archiv f. Pathol. Anat.*, Bd. IV., s. 400). The liver was transformed into an irregularly-rounded body, weighing about four pounds, of a dirty-white color, and with numerous prominences over its outer surface, which at

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has shown how difficult it is to distinguish between these two morbid changes of the liver (*Archiv f. Path. Anat.*, Bd. XV., s. 352), whilst he has discovered the calcareous corpuscles, hooklets, and laminated membranes of the echinococci in a preparation in the Museum at Dorpat, which in its appearance and structure closely resembled the colloid cancer of the liver described by Luschka. Luschka, however, goes too far, in calling in question the existence of such a disease as colloid cancer of the liver; at all events, tumors are met with in this organ, which in their structure agree with the colloid cancers of other organs. This remark applies to Luschka's own case (*Archiv f. Pathol. Anat.*, Bd. II., s. 400), and likewise to another which came under my own observation, and probably also to a case recorded by Van der Byl (*Transactions of the Pathological Society of London*, Vol. IX.). My colleague, Professor Luschka, had the kindness to present me with a portion of the preparation from his case, and I have in vain examined it for the elementary constituents of echinococci.

The entire subject, however, of colloid cancer requires a thorough revision in reference to multiple echinococci; and the more so as, strange to say, Wurz has ascertained that the gelatinous substance of a colloid cancer examined by Lebert was very poor in nitrogen, and resembled chitine (*Archiv f. Pathol. Anat.*, Bd. IV., s. 203), a composition which Lücke has recently determined, by elementary analysis, to be likewise characteristic of the membranes of hydatids (*ibid.*, Bd. XIX., s. 190).

some places presented thickenings of the serous envelope. On the lower surface of the organ were seen innumerable clusters of transparent nodules, lying close to one another, varying in size from a pea to a walnut, with saline watery contents and thin lacerable walls. No trace remained of the gall-bladder and transverse fissure of the liver, and the parenchyma of the liver had completely disappeared, with the exception of a small portion of the left lobe, which was in a state of fatty degeneration. Its place was occupied by a fibrous matrix, with innumerable cavities, which were filled with a gelatinous-looking substance. On microscopic examination, Luschka discovered spindle-shaped or rounded cells, containing one or several nuclei, in addition to numerous rod-like (*stäbchenartig*) crystals, granular corpuscles, and flattened epithelium. The patient, from whose body the preparation was obtained, was a man 63 years of age, who for many years had suffered from derangements of the digestive organs, and ultimately died from exhaustion.

In the observation recorded by Van der Byl (*Transactions of the Pathological Society of London*, Vol. IX., p. 207) the disease was confined to the outer surface of the liver, together with the ligaments and gall-bladder; the parenchyma was implicated to a less extent. The chief seat of the colloid cancer in this case was the peritoneum and omentum.

These are the forms under which cancer attacks the liver, and the changes which it produces in the several tissues of the gland:—

The external characters of the organ, an accurate knowledge of which is indispensable for diagnosis, vary considerably.

The size of the liver is in most cases increased, and sometimes to colossal dimensions; its weight sometimes attains to 10, 15, or 20 pounds, or even more.[1] Of 31 cases which have come under my observation, the liver was enlarged in 22; 3 times it was small, and 6 times of normal size. Of 60 cases observed by others, in 15 the volume of the gland was not stated; in 38 it was enlarged, and in 16 of the 38 the weight varied from 8 to 20 pounds; in 3 cases the liver was reported as reduced in size, and in 4 as normal. If we add the last 4 to the 15 cases, with regard to which no mention was made of the size, we have 19 cases out of 60, or 25 out of 91, in which the size of the organ did not differ in any material degree from that of the normal state.

The form of a liver affected with cancer usually loses its regularity, and becomes uneven; bulging prominences, presenting for the most part an umbilicated depression, or elastic semi-globular tumors, are developed upon the margins and outer surface of the organ. Much more rarely, the form of the gland remains unaltered, its outer surface is smooth and even, none of the nodules existing in the interior projecting from it. Cases of this nature, of which three have come under my observation, are readily mistaken for enlargements of another nature, and more especially for the waxy liver. (See Observation No. X.)

The consistence of the liver is usually altered in a remarkable manner, the projecting nodules being, as a rule, much harder than the normal hepatic tissue; but occasionally cancerous nodules are so soft as to give rise to a feeling of fluctuation, and cause the cancer to be regarded as an abscess or a cyst. (Observation No. XI.[1])

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[1] See Tables in Vol. I., pp. 18, 19, 20, and 21. Colliny (*Archives Gén. de Méd.*, Tom. X., 1836) has described a cancer of the liver which weighed twenty pounds. I have met with an instance where a cancerous liver filled up almost the entire abdominal cavity, and exceeded twenty pounds in weight; unfortunately, the precise weight could not be ascertained, as the *post-mortem* examination was made in private practice.

Cancer of the liver is rarely solitary; in most cases it coexists with similar disease in other parts of the body. The relation of the cancer in other organs to that of the liver may be twofold; at one time the hepatic affection is the primary disease, and the other cancers are secondary, while at another the relation is reversed, the morbid growth in the liver deriving its origin from those in other parts of the body, or being secondary to them.

The symptoms indicating the development of the disease, the anatomical characters denoting the older or more recent date of the cancer, and the direction in which the disease extends, in most cases render it an easy matter to determine whether the liver is primarily or secondarily diseased; but to this rule there are exceptions. Cases occur in which so many organs are affected with cancer, and where the distinctions between the ages of the several morbid growths are so indefinite, that it is impossible to decide with certainty where the disease commenced. In many cases the universal appearance of cancer can only be accounted for on the supposition of a peculiar diathesis.

Primary cancer of the liver rarely extends widely throughout the body; it occupies an inferior position in this respect to cancer of the mamma and uterus. The cancer multiplies itself at first locally in the liver; the large old tumors in the gland are almost invariably found associated with smaller ones of more recent date. The further extension of the disease is effected, in the first place, by means of the continuity of the peritoneal envelope with the investing membrane of the diaphragm, the duodenum, the stomach and pancreas, and with the parietal peritoneum, by the propagation of the cancer through the diaphragm to the pleura, &c. In many cases this mode of extension is assisted by the newly-developed adhesions. The lymphatic vessels and veins constitute another medium of propagation of cancer of the liver. By means of the former, the disease extends to the lymphatic glands in the fissure of the liver and in the anterior mediastinum, to the cœliac glands, and occasionally along the thoracic duct to the deep cervical glands. Much more rarely cancer extends from the liver through the veins, and then it is found in the lungs, although in most cases only in the form of a few isolated nodules.

Secondary cancer of the liver is most frequently the consequence of cancer in some of the organs in the portal system, more especially of the stomach, but also of the intestines, pancreas, &c. It usually reaches the liver through the medium of the venous circulation, and then appears in the form of numerous disseminated nodules,[2] or, in other cases, the liver becomes implicated through the lymphatics, in which case the disease first advances along the gastro-hepatic and duodeno-hepatic ligaments to the fissure of the liver, and then penetrates into the interior of the organ along with Glisson's capsule. (See Observations No. XVIII. and No. XIX.) Cancer, however, of any part of the body may be followed by secondary deposits in the liver, and, indeed, in cases of extensive cancer it is rare for this organ to remain exempt. Cancer of the liver is very frequently found to supervene upon cancer of the mamma; in this case there are almost always deposits in the lungs as well.[1] Cancer of the liver is also frequent in the course of cancer of the uterus, ovaries, bones, skin, &c.

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[1] I am acquainted with a case of this nature, where a surgeon punctured the tumor, and death from hæmorrhage was the result.

[2] Meyer (*Zeitschrift f. rat. Medicin*, *neue Folge*, III., s. 136), in a case of cancer of the pylorus, succeeded in tracing the cancer into the portal vein, as far as the outer surface of the liver, where it assumed the form of rounded nodules.

As regards the relative frequency of primary and secondary cancer of the liver, and the proportion in which the several organs, in the case of secondary cancer, contribute to the development of cancerous deposit in the liver, my experience yields the following results:—Of 31 cases, the cancer was confined to the liver and the adjoining lymphatic glands in 5; in 2 cases it was accompanied by cancer of the lungs; in 2 by cancer of the lesser omentum and of the cœliac and cervical glands; and in 1 by cancer of the pericardium and pleura; in these cases, the cancer in the other organs was so slightly developed, that it was necessarily regarded as secondary to that in the liver. In addition to these 10 cases of primary hepatic cancer, there were 21 others, in which the disease of the liver was evidently of a secondary nature; of these there were 10, in which it was consequent upon cancer of the stomach; 1, where it followed scirrhus of the pancreas, 1, where it accompanied scirrhus of the rectum; 2, where it accompanied cancer of the mammæ; and 2, where it accompanied cystic cancer of the ovaries; 1, where it was associated with medullary fungus of the retina; 1, with cancer of the brain; 1, with cancer of the retro-peritoneal glands; 1, with cancer of the anterior mediastinum; and 1, with epithelial cancer of the heel.

The 60 observations of other authors which I have collected, do not admit of such a complete analysis, because the descriptions of the cases, some of which were very complicated, are not always given with the minuteness necessary for the purpose. The following results, however, may be relied on:—Of 60 cases, 24 were accompanied by cancer of the stomach, of which the cancer was in the small curvature twice, in the great curvature three times, and in the pylorus ten times, while in 9 cases no mention is made of its precise seat; in 9 cases, there was cancer of other organs in the portal system, whereof the small intestine was the seat of the disease five times, the pancreas three times (in a fourth case the pancreatic disease was evidently secondary), the spleen once (in another case, the cancer of the spleen and liver were both consequent upon cancer of the cranial bones). Thus, of the whole 60 cases of hepatic cancer, there was cancer of some other organ in the portal system in 34. Of the remaining 26 cases, there was cancer of other organs in 14, namely, cancer of the mammæ five times, of the uterus three times, of the ovaries twice, of the eye once, of the skeleton three times (the cranium, the sternum, the pelvis, &c.). Hence of the 60 cases, there remain 12 in which the cancer of the liver must be regarded as primary.

If to the last cases my own observations be added, it follows, that of 91 cases of cancer of the liver, 46, or one-half, were accompanied by cancer of those organs, whose venous blood is transmitted to the liver, whereof 34 were cases of cancer of the stomach. Moreover, of the 91 cases, there was cancer of other organs, which was evidently primary, in 23, and thus there remain only 22 cases, in which the liver was primarily diseased. It follows, that of the total number of cases, the cancer was primary in nearly one-fourth, and secondary in three-fourths, and that of the secondary cases the site of the primary disease was some organ of the portal system in two-thirds, and some other part of the body in the remaining third.

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[1] In one case I have known cancer of the liver developed for the first time, nine years after the extirpation of a cancerous mamma.

In addition to these morbid changes, which in their nature resemble that observed in the liver, other anatomical lesions are found, which are more or less nearly related to the hepatic affection. Among these may be mentioned jaundice, effusions of various sorts into the peritoneum, catarrh of the stomach and intestines, pleuritic exudations, chronic nephritis, &c. The frequency of these accidents, their mode of development and importance will be considered in detail under the head of Symptomatology.

3. *Ætiology.*

The intimate cause of the development of hepatic cancer, like that of cancer in general, is entirely unknown. We are only acquainted with those external conditions which accompany the development of this pseudo-plasma, and which it is the custom to connect, although remotely, with the disease. The most important of those conditions are the following:—

a. *Age.*—Cancer of the liver belongs pre-eminently to the later periods of life. Farre mentions three cases which occurred in early youth, but in all three the cancer was secondary. The first case was that of an infant, three months old, in whom cancer of the liver and lungs supervened upon cancer of the retroperitoneal glands; the second was that of a boy, aged 2 years and 7 months, with cancer of the testis; the third was that of a child, 2½ years of age, with cancer of the pelvis. The youngest individuals with cancer of the liver, who have come under my observation, have been a man, aged 20, with medullary fungus of the testis, and a female, 22 years old, whose eyeball had been extirpated on account of cancer. Of 31 cases observed by myself, and 52 recorded by others, the ages were as follows:—

		20 to 30 years.	30 to 40 years.	40 to 60 years.	60 to 70 years.	Above 70 years.
My own Observations	31	2	4	15	8	2
Observations of other Authors	52	5	10	26	11	0
Total	83	7	14	41	19	2

2. *Sex.*—Sex appears to exercise no influence in predisposing to the disease of the liver in question, which is found to be almost equally frequent in women as among men. Of my own 31 cases, 10 were men and 21 women; of 60 cases already recorded, 35 were men and 25 women; of the total 91 cases, 45 were males and 46 females.[1]

No particular abnormal conditions are known to predispose to the development of cancer of the liver. The disease is met with in the anæmic, as well as in the plethoric; in the badly fed, as well as in those who live luxuriously. That the disease is relatively more frequent in the latter class, as maintained by Budd, is not confirmed by my experience.

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[1] Of 29 cases recorded by Van der Byl, 13 were males and 16 females; the mean age of the males was 41, and of the females 50.—(*Transactions of the Pathol. Society*, Vol. IX.)

Spirituous liquors, which so easily derange the nutrition of the liver, do not predispose to cancer of the liver. The same may be said of climate. Cancer of the liver is endemic in warm, as well as in cold countries; as yet we know no difference in this respect.

As in the case of cancer of the mammæ, lips, &c., a contusion is very frequently blamed as the first exciting cause, but whether rightly or wrongly cannot accurately be determined with the materials at present at our disposal. It is probable, however, that external injury may, under favorable circumstances, give the first impetus to the disordered nutrition of the hepatic tissue.

The data hitherto recorded do not suffice to determine whether any important influence is to be attributed to hereditary transmission.

4. *Symptoms of Cancer of the Liver.*

The clinical history of cancer of the liver varies very greatly, because the local symptoms, which alone are diagnostic, are at one time prominently developed from the first, but at another, remain either undefined or latent. Cases are met with, although they are rare, where all signs of hepatic disease are wanting, where complaints of an undefined character, indigestion, flatulence, constipation, together with disordered innervation (constituting a group of symptoms, which is often looked upon as hypochondriasis), are at first the sole symptoms, and where the increasing cachexia, ultimately terminating in death, is the only indication of an important lesion. In other cases the consecutive diseases, such as chronic peritonitis, ascites, pleurisy on the right side, &c., give rise to symptoms, which obscure those of the fundamental malady. Again, in other cases, there are derangements proceeding from the primary diseases, to which the hepatic affection is secondary, which engage the attention exclusively, and cause the disease going on in the liver to be overlooked. This is particularly apt to happen when the primary disease is cancer of the stomach.

Still these are exceptional cases. As a rule, a group of symptoms are developed in connection with cancer of the liver, which are sufficiently characteristic, and which enable us to have a clear insight of the changes taking place in the liver.

Individuals in the middle or advanced periods of life, first complain of loss of appetite, flatulence, constipation, distention, and tenderness of the epigastrium, or of the right hypochondrium. After these symptoms have lasted for a long time, either continuously or in an intermittent form, sometimes, however, at the very commencement of these symptoms, or even before they are noticed at all, a swelling is observed in the hepatic region, which is usually painful and tender upon pressure. The surface and margins of this swelling are, in exceptional cases, smooth, but in most cases are covered with large or small, hard (rarely soft) nodules; its size increases sometimes slowly, and at other times rapidly. With these symptoms are not unfrequently associated jaundice and ascites, and sometimes also, œdema of the feet. From time to time the symptoms undergo aggravation, the pains become more acute, and extend towards the shoulders and hips; the abdominal walls become tense, the breathing is impeded, the skin is hot and dry, the pulse is accelerated. These exacerbations, which depend upon a rapid growth of the cancer, or upon the supervention of inflammation of the surrounding parts, come and go; the patients, whose condition from an early period has been cachectic, gradually lose flesh and strength, become despondent, and ultimately die exhausted. Occasionally death occurs at an early stage from the supervention of peritonitis of pleurisy, or from hæmorrhage, dysentery, &c.

Mode of Development, Frequency, and Importance of Individual Symptoms.

a. *Characters presented by the Liver.*

Enlargement of the liver, its uneven surface, and tenderness constitute the most important signs of cancerous degeneration of this organ. Usually, these signs can be easily discovered by means of palpation and percussion.

All grades of enlargement of the gland are met with; the tumor may be so considerable, as to fill up almost the whole abdominal cavity.[1]

The nodulated protuberances are felt sometimes at the margin of the right costal arch, at other times in the epigastrium or left hypochondrium, and sometimes even so low as the brim of the pelvis. They are for the most part hard and uneven, but in rare cases soft, with a feeling resembling fluctuation. They are most easily discovered by tracing the sharp margin of the liver, and by employing palpation over the surface of the gland, at the edge of the rectus muscle. Their detection is much more difficult at those parts where the gland is covered by the recti muscles, and, moreover, the tense bellies and aponeurotic constrictions of the muscles themselves are very apt to mislead. It is far from uncommon for the cancerous nodules of the liver to be visible through the abdominal parietes, as uneven tumors, which descend with inspiration and ascend on expiration. Sometimes, moreover, when the hand is laid upon the abdomen, and particularly when the patient takes a long breath, a sensation of friction can be felt, while at the same time a friction sound can be heard through the stethoscope.

The degree of tenderness of the organ varies very greatly; it is greater or less according as the growth of the cancerous formation is rapid or slow, and according to the presence or absence of inflammatory irritation in the neighborhood. By strong percussion, also, it is usually produced at those places where it is not felt on simple palpation.

The three alterations of the liver just mentioned are by no means constant accompaniments of cancer. According to my experience, there is no increase of volume in more than one-fourth of the cases, and this result is confirmed by the observations of other physicians.

The smaller the organ is, the more difficult it is to discover the irregularities, because the gland is for the most part, or altogether, concealed beneath the ribs. In such a case, the persistent tenderness upon percussion is an important aid in diagnosis. Irregularities of the surface may, however, be entirely absent, as happened in three of my cases, where the gland remained smooth throughout.

So likewise the tenderness is sometimes absent. It is rare, however, that this want of tenderness continues throughout the entire disease (in 2 only out of my 31 cases), more frequently this freedom from pain lasts only for a few days or weeks.

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[1] In the case of the enormous hepatic cancer already mentioned, the abdominal cavity was so completely filled up that at an advanced stage of the disease it appeared impossible to determine whether the nodulated morbid growths had originated in the liver, spleen, kidneys, or ovaries.

b. *Jaundice.*

Cancer of the liver is only accompanied by jaundice when the situation of the tumors is such as to implicate the larger bile-ducts, or when the cancer is associated with catarrh of the ducts. The jaundiced tint of the skin and urine is sometimes faint, when only a few branches of the hepatic ducts are destroyed, or when the compression is incomplete, while at other times it attains a considerable degree of intensity, and then the inference is, that a cancerous tumor has become developed in the fissure of the liver, between this and the duodenum, in such a way as to obstruct the flow of bile.

The jaundice dependent upon hepatic cancer never disappears; it remains until the end, and in this respect differs from other forms of jaundice of a more incidental character, which are liable to supervene in consequence of catarrh of the ducts or gall-stones.

As a symptom of cancer of the liver, jaundice is of little value, for it is absent in the majority of cases. Of my 31 cases it was present in only 13; of 60 observations of other physicians it was noted in 26; thus, in the whole 91 patients, 52 died without having presented this symptom.

c. *Ascites.*

Cancer of the liver may give rise to watery effusions into the peritoneal cavity in various ways. In most cases, the effusion is due to chronic peritonitis, extending from the liver over the peritoneum; in rarer cases it is caused by occlusion of the trunk, or large branches of the portal vein; hydræmia also favors its production, although in a slight degree. In the majority of cases, I have found the serous effusion mixed with flakes of lymph, and repeatedly even with blood. In one case, the peritoneal cavity was half filled with pure blood, which had escaped from a medullary cancer, in consequence of rupture of the capsule of the liver.

The ascites not unfrequently increases to a considerable extent, so that paracentesis becomes necessary in order to alleviate the breathing. Under such circumstances, it always accelerates the downward progress of the case. It is only in rare cases, when the effusion has been due to some transient irritation of the peritoneum, that the fluid is reabsorbed. Hence, we ought to be cautious in attempting to remove ascites by means of powerful remedies, such as drastic purgatives. Such attempts lead to no other result, than the premature exhaustion of the patient.

As regards the frequency of ascites, of my 31 cases, the peritoneum contained large quantities of fluid in 18; five times the fluid consisted of pure serum, eight times of serum containing fibrinous flakes, four times of bloody fluid, and once of pure blood. Of 60 observations recorded by other authors, ascites was present in 30, in 19 it was absent, and in 11 cases no mention is made of it.

d. *The Spleen.*

Contrary to what holds good in many other affections of the liver, the spleen, in cases of hepatic cancer, is very rarely enlarged. Of the 91 cases subjected to analysis, there was enlargement of the spleen in only 12; in all the other cases the organ was either of normal size, or small. This character is of importance, in distinguishing cancer of the liver from waxy liver and cirrhosis.

e. *Digestion.*

As a rule, the gastric as well as the intestinal functions are deranged in cases of cancer of the liver. Even at an early period, the appetite becomes impaired, and the patient suffers after each meal from distention of the epigastrium, nausea, and other symptoms of indigestion; while, at the same time, the bowels are confined, and in the advanced stages the stools are deficient in bile, and are clay-colored, and there is flatulence. Of the cases which have come under my notice, in 6 only have the functions of the stomach, and in 3 those of the intestines, been unaffected; in all the others they were deranged; in 4 cases there was diarrhœa, and in one of these four there was likewise dysentery.

The causes of these derangements of digestion are mainly to be sought for in the abnormal distribution of blood in the gastro-intestinal tract, to which cancer of the liver gives rise, in the mechanical injury of the other abdominal organs, in the irritation of their peritoneal investments, in the defective secretion, and frequently also in the obstructed excretion of bile—conditions against which treatment is of little avail.

f. *The Respiration.*

The respiration in cases of cancer of the liver occasionally suffers derangements, which are due to participation of the diaphragm in the cancerous degeneration, to the distention of the abdomen, or to pleurisy on the right side. I have never seen secondary cancerous tumors in the lungs in such number that they could have embarrassed the breathing.

As is the case in all cachectic conditions of the system, death is apt to be induced in the advanced stages by œdema of the lungs and consecutive pneumonia.

It is worthy of notice, that tubercles are very rarely developed in the lungs in conjunction with cancer of the liver; three times only I have found tubercles in the lungs, which were undergoing retrograde metamorphosis.

g. *Constitution and Habit of Body in Cancer of the Liver.*

Exceptional cases are met with, where patients suffering from cancer of the liver are well nourished. I have seen only two cases of this nature, and in both there was a medullary cancer. (Observation No. XI.)[1]

The habit of body usually assumes the characters indicative of disordered nutrition, and diminution in the quantity of blood; the patients become pale and earth-colored, emaciate, and lose their strength. The color of the skin is not unfrequently pale, like that of chlorotic persons; it only appears yellow where there is some obstruction to the excretion of bile, and then it presents every shade, from a pale jaundiced tint to a deep-citron-yellow or olive-green.

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[1] Oppolzer likewise observed only very slight emaciation in one of his cases.

The destruction of the vegetative functions advances more or less rapidly, according to the intensity of the causes which lead to it.

The most important of these causes is the following:—The tumor in its growth consumes a large quantity of albuminous substances which are drained from the blood, the amount of which is greater, the more rapid is the growth.[1] Hence, scirrhous cancers, which increase slowly, are less prejudicial in this respect than the soft forms of cancer. To this cause of waste should be added the extravasation of blood into the tissue of the cancer, which induces very rapid exhaustion.

The disordered digestion and elaboration of blood constitute a second cause of the anæmia; while a third is the serous effusions, with which the abdominal cavity is usually filled at an early period.

It is more difficult to estimate the injurious consequences which the vegetative processes suffer from destruction of a large portion of the hepatic parenchyma. It is only in a few cases that this loss is compensated for by hypertrophy of the remaining portion of the gland; but certainly in these cases the nutrition has appeared to me to be less impaired.

It is still undecided, whether the absorption of liquid cancer-juice into the blood can entail other injurious consequences, besides the dissemination of the cancer to distant organs.

Lastly, the hæmorrhages, which supervene in the later stages of cancer of the liver, and accelerate the exhaustion, are worthy of notice. They are of various sorts. Independently of the extravasations of blood into the interior of the tumor, and from this into the abdominal cavity, hæmorrhages are sometimes observed from the stomach and intestines in consequence of occlusion of the portal vein; in one case, I have seen death ensue in a few days from this cause. Another form of hæmorrhage is that from the serous membranes, which accompanies the serous effusions into the pleura and peritoneum. Lastly, hæmorrhages are met with of a nature similar to those of purpura and scurvy. In this case, ecchymoses and petechiæ are developed upon the skin, while hæmorrhages take place from the lining membrane of the mouth, nostrils, vagina, and intestines, which from their amount induce exhaustion and soon terminate fatally. I have observed this last form four times, and in every instance the hæmorrhages were accompanied by intense jaundice, and in most cases also by delirium and somnolence. The fundamental cause of the symptoms in these cases, must be similar to what induces the symptoms of dissolution (*Dissolutions erscheinungen*) consequent upon acute atrophy of the liver, of which mention was made in Volume I.

5. *Duration and Progress of Cancer of the Liver.*

It is impossible to determine accurately the duration of cancer in the liver, inasmuch, as its first commencement eludes observation. If we reckon from the date of the earliest symptoms to the termination, there are great differences in respect to the progress of the disease. There are cases which terminate fatally at the end of from four to eight weeks, where the disease is accompanied by fever, almost without intermission, throughout its entire course ;[1] and there are others where the disease is protracted over years, until the highest grade of marasmus is attained. The former course characterizes the medullary form of cancer, the latter, scirrhus. The progress, however, is never completely uniform; exacerbations and remissions alternate; periods during which the tumors grow rapidly, the pains increase, and fever shows itself, are followed by others in which the morbid growth is quiescent or retrogrades.

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[1] Budd (*op. cit.*, p. 410) mentions a case, where, in five months, a cancerous mass, about five pounds in weight, was developed in the liver, and where he calculated that the albuminous constituents of the cancer had consumed about twenty pounds of blood. Farre (*op. cit.*, p. 28) thought he could estimate the increase of a cancerous liver, in ten days, at five pounds.

The termination is always fatal; no one has succeeded in proving beyond doubt a single instance of cure. The retrograde anatomical changes which may be traced in the tumors, are unfortunately of an entirely local character, and in no way avert the destruction impending over the entire organism.

6. *Prognosis.*

From what has been stated, it is obvious, that the prognosis under all circumstances is fatal. It is only in the case of hard cancers, which grow slowly, that we can succeed, by appropriate treatment, in preserving life for a long time.

7. *Diagnosis.*

It is not a difficult matter to recognize cancer of the liver, when the organ can be felt, and the changes above described can be discovered. Although, under such circumstances, it is possible to confound cancer with other diseases of the liver and adjoining organs, as a rule, mistakes are easily avoided. The question, however, is otherwise, when the liver is not enlarged, and is concealed beneath the costal arch. Here all signs of disease of the liver may be wanting, and the only symptoms may be those of marasmus, usually associated with those of indigestion. In such cases, the persistent tenderness of the liver induced by percussion of the hepatic region, the commencing ascites, and the absence of any other cause of cachexia, may give grounds for the suspicion of cancer of the liver; a certain diagnosis is, however, impossible.

It is likewise a difficult matter to recognize the disease at its commencement, because then the nodulated projections are wanting, and all that is present is a swelling, tender upon pressure.

The long duration of the swelling, the age of the patients, their cachectic appearance, and lastly, the absence of other causes to account for the enlargement must, under such circumstances, lead to the supposition that there is cancer of the liver.

The following are the diseases of the liver and other organs, which are most frequently confounded with cancer of the liver:—

a. *Waxy Liver.*

Here there is certainly the same increase in volume as in cancer, but the irregularities of surface and the pains are absent, while, on the other hand, there is in most cases enlargement of the spleen, together with albuminuria, and, moreover, the presence of waxy liver is indicated by definite exciting causes, such as caries, necrosis, &c.

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[1] See Observation No. XI. Bamberger records an observation where the disease was complicated with hepatitis and acute febrile symptoms, and terminated fatally at the end of eight weeks.

A mistake is far more apt to be committed in the case of the cirrhotic waxy liver, which, like the cancerous liver, has a nodulated surface, and is also sometimes painful. In most cases of cirrhosis, however, the nodules are much smaller; the tenderness upon pressure also is usually only periodically present, when there is an exacerbation of the inflammation.

b. *Hepatitis Syphilitica.*

Syphilitic hepatitis may easily give rise to mistakes, when, in consequence of the cicatrices, the organ has become uneven and lobulated. The most important point of distinction is the consistence, which in cancer is always altered, while the prominent nodules formed by syphilitic inflammation retain the consistence of the normal hepatic tissue, unless, as now and then happens, the gland has at the same time undergone waxy degeneration. But in this case, the spleen is always likewise enlarged, and in most cases, the kidneys also. Moreover, this condition of liver is accompanied by syphilitic cicatrices in the throat. There are cases, where an accurate diagnosis can only be arrived at after protracted observation. (See Vol. II., p. 164, and likewise Observation No. VIII.) It is cases of this nature which have induced Oppolzer and Bochdalek to adopt the erroneous assumption of the curability of hepatic cancer.

c. *Tight-Lace Liver.*

I have met with several cases where the rounded hard margin of the right lobe of the liver, which was pushed far down by a tight-lace fissure, has been mistaken for cancer.

The absence of any cachexia, and the fact of there being no smaller nodules, together with the slight degree of tenderness, and the possibility of recognizing the fissure by means of palpation, will prevent any mistake in such cases.

d. *Echinococci.*

Hydatids have a less injurious effect upon the constitution, in most cases they fluctuate distinctly, and they form rounded globular tumors, which are either altogether painless, or are only occasionally the seat of pain; their progress, moreover, is more chronic than that of cancer. (See Observation No. IV.)

e. *Hepatic Abscesses.*

It is only the soft, rapidly-growing cancers of the liver, which exhibit a certain resemblance to suppurative hepatitis. There are important differences, however, between the causes and progress of the two affections, while abscess of the liver is also characterized by suppurative fever at the commencement of suppuration, and afterwards by distinct fluctuation.

f. *Dilatation of the Bile-ducts and Gall-bladder, in consequence of Occlusion of the Hepatic Duct and Ductus Choledochus.*

This condition is usually distinguished with ease from cancer of the liver, by the absence of hard nodules. It is very difficult, however, or sometimes even impossible, to diagnose that form of cancer, where the morbid growth penetrates the liver along Glisson's capsule, because in this case no irregularities can be felt in the outer surface. The egg-shaped gall-bladder, projecting from the margin of the liver, can only be mistaken for a cancerous tumor, when there is a want of the *tactus eruditus.*

g. *Cancer of the Omentum.*

Cancer of the omentum is usually distinguished with facility from cancer of the liver, by the form and boundaries of the tumor, which differ essentially from the contour of the liver. There are, however, exceptions, where, as is shown in the annexed cut (Fig. 12), cancerous tumors of the lesser omentum correspond closely to the form of the liver, and where it is impossible to distinguish between them and cancer of the liver. Moreover, a cancerous liver may fill up the abdomen so completely, that it is impossible to determine at what part the disease commenced.

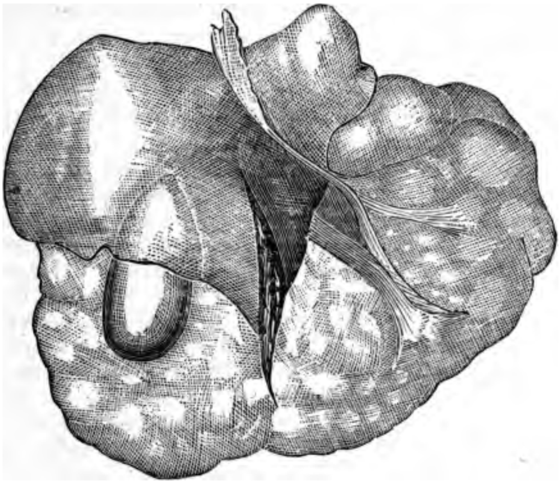

FIG. 12.—Cancerous tumor of the lesser omentum, assuming the form of the liver, which is compressed and atrophied. The gall-bladder is much enlarged from occlusion of the cystic duct.

h. *Cancer of the Stomach.*

When the cancer is situated in the left lobe of the liver, or at the margin of the right lobe, it is often difficult to determine whether the stomach or the liver is diseased. Here we must have recourse in the first place to percussion, which yields a dull sound in the case of cancer of the liver, but a tympanitic sound when it is the stomach which is diseased; the digestion is also more deranged when the disease is in the stomach. In cancer of the stomach, the vomiting is much more constant,[1] and the vomited matters are mixed with blood; moreover, the patient's sufferings are aggravated after every meal. It is not unfrequently impossible, by means of mere palpation, to distinguish cancer of the stomach from cancer of the liver.

i. *Cancer of the Right Kidney.*

The tumor formed by a cancerous kidney is usually separated from the liver by a coil of intestine; but to this rule there are exceptions. I have met with a case where the liver and kidney could not be separated by percussion, and where the diagnosis could only be determined by the other boundaries of the tumor, and by the absence of any movement in the tumor on inspiration.

k. *Accumulations of masses of Fæces in the Transverse Colon.*

These accumulations can only be distinguished with certainty from nodules upon the liver, when the precaution is taken, in all cases of obscure abdominal tumors, to clear out the intestinal canal before making an examination.

8. *Treatment.*

As soon as the diagnosis is ascertained with certainty, the treatment can only be directed against symptoms. The value of an accurate diagnosis depends upon the circumstance, that an active line of treatment, which would greatly accelerate the unfavorable event, is thereby avoided, while, on the other hand, enlargements of the liver, which are curable, are treated properly at the right time. The attempts which were formerly made, and continue to be made at the present day, to cure cancers of the liver by means of the preparations of Iodine or Mercury, by Arsenic, by the waters of Karlsbad[2] and of other similar springs, are very objectionable; they hasten the advent of death by months or even years. It is only so long as there are any doubts about the real nature of a painful swelling of the liver, that the disease ought to be combated by means of local abstractions of blood, by the alkaline waters of Karlsbad, Marienbad, and Kissengen,[2] and by the use of fruit and whey, which are to be employed according to the state of the constitution. As soon as we are certain of the real nature of the case, every measure of a debilitating nature is to be avoided, and we must restrict ourselves to moderate the derangements of digestion, to prevent any impoverishment of the blood, and to combat, as far as possible, troublesome and dangerous symptoms. The bitter extracts dissolved in aromatic infusions, and combined, if necessary, with antacids, are especially fitted for the regulation of the digestion; the intestinal functions are to be regulated by means of Rhubarb, Aloes, and allied substances; when the bile is prevented entering the intestine, we must have recourse to the Choleate of Soda, in order to improve the intestinal digestion, and limit the development of gas. The cachexia is best opposed by means of a light nutritious diet, by extract of

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[1] Andral, however, observed obstinate vomiting in a case of cancer of liver, which pressed upon the pylorus.

[2] For the composition of these springs, see Vol. I., p. 88, *note.*—TRANSL.

Cinchona, and by small doses of the Lactate of Iron, and of the chalybeate waters of Pyrmont and Franzensbad.[1] The pains are to be moderated by means of warm cataplasms, narcotic liniments, warm baths, and, only when the powers of the patient are good, by careful local abstractions of blood. The employment of drastic purgatives or stimulating diuretics does more harm than good; in cases of urgency the trocar is to be preferred. When hæmorrhages threaten to prove exhausting, we must endeavor to check them by means of Tannin, Alum, the Liquor Ferri Sesquichloridi, &c.

9. *Illustrative Cases.*

The following observations will illustrate and elucidate many of the details above given.

I. Primary, Independent Cancer of the Liver.

Observation No. V.

Jaundice, many years before Death, followed by persistent Intermittent Fever with Dropsy.—Paralysis of the Right Arm.—Painful, rounded Tumors in the Epigastrium, which increased very rapidly.—Derangement of the Stomach.—Anasarca.—Albuminuria.—Pneumonia of the Left Lung.—Death from Pulmonary Œdema.

Autopsy:—Liver enormously enlarged, and containing numerous Cancerous Tumors.—Enlargement of the Hepatic Artery.—Hepatization of the lower lobe of the Left Lung.—Advanced Bright's Degeneration of the Kidneys.

Elizabeth Götz, widow of an artisan, was under treatment, from the 3d to the 10th of February, 1858.

The patient, who had always before enjoyed good health, at the age of 32, during her second confinement, had an attack of jaundice in consequence of a fright, which, without interfering with the nutrition of the infant, lasted for ten weeks, and gradually disappeared under the use of emetics, by means of which a large quantity of bile was brought away.

The jaundice did not return in any of her four subsequent accouchements.

Two years after her first illness, she suffered from an attack of intermittent fever of a quotidian and quartan type; after this had lasted for a month, dropsical swellings supervened, but the swelling, as well as the fever, disappeared under medical treatment.

There remained, however, weakness and dyspnœa, without any cough. The menses ceased at the usual time; their cessation was characterized by the supervention of cough and bloody expectoration, every fourth week, often accompanied by vomiting. The cough still continued at the period of admission, but the sputa were simply catarrhal.

Latterly she had been frequently occupied in washing, and one day in the midst of her work, she suddenly experienced a loss of power and sensibility in the right arm, which symptoms improved but slowly, and rendered it impossible for her to continue washing, or even to lift a small weight. At the same time she complained of constant pricking sensations in the points of the fingers. There was no emaciation of this extremity, and the right foot remained unaffected.

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[1] For the composition of the waters of Pyrmont, see Vol. I., p. 85, *note;* for that of the springs of Franzensbad, or Eger in Bohemia, see Vol. I., p. 220, *note.*—Transl.

In the spring of 1857, the woman felt a prominent tumor in the epigastric region, which was very painful, and compelled her to seek admission into the Hospital, where, however, she only remained for ten days.

Soon afterwards, she noticed another prominence immediately below the first one, which increased rapidly in size. The patient continued to support herself by going about begging, but at last, general dropsy supervened and her strength failed, so that on the 3d of February, 1858, she was again obliged to come to the Hospital.

On the patient's admission, she appeared very emaciated; her face and right arm were slightly œdematous; her legs and the skin of the abdomen, extremely so. On examination of the front of the chest, no marked dulness could be detected; over the upper part of the left lung the respiratory murmur was very faint, and râles (*Schnurren*) were audible over the whole of the right lung. Posteriorly, there was slight dulness on percussion with indistinct respiratory murmur over the bases of both lungs, extending as high as the angles of the scapulæ. The sounds of the heart were normal; the impulse could be felt between the third and fourth ribs.

The abdomen was distended; the umbilicus was completely obliterated; the distance between the umbilicus and the ensiform cartilage was increased, and the cutaneous veins were at this part much enlarged.

Globular projections of unusual size could be seen at many parts of the abdomen. A tumor, furnished with numerous nodulated and painful protuberances, could be felt, extending from the margin of the right ribs downwards to the brim of the pelvis, and towards the left, as far as the iliac region. The lower margin of this tumor could be distinctly traced with the points of the fingers, passing transversely across the abdominal cavity. The tumor was movable, and was distinctly depressed on inspiration.

The perpendicular hepatic dulness in the right mammary line amounted to 25 centimètres (10 Eng. inches), in the epigastrium to 16 centimètres (6⅓ Eng. inches), while the dull space corresponding to the left lobe measured 30 centimètres (11⅘ Eng. inches). A line drawn from the right to the left axillary line, on a level with the umbilicus, measured 43 centimètres (17 Eng. inches).

The appetite was very slight; the tongue was grayish-yellow; the bowels were confined; the urine was scanty, and loaded with albumen, and contained numerous very pale casts, which were free from both epithelium and oil globules.

There was great dyspnœa, with a little mucous expectoration. Pulse 100 and small.

Decoction of Senega Root, with Extract of Cinchona and Liquor Ammoniaci Anisatus[1] was prescribed.

On the 8th of February, the patient complained of pains in the posterior and lower part of the left side of the chest, and here there was dulness on percussion, with bronchial breathing, extending as high as the scapula; there was a severe cough without any expectoration. Pulse 110; the temperature in the evening was 39·4° cent. (102·9° Fahr.). Warm cataplasms were ordered to be applied externally, and Decoction of Senega with Benzoic Acid was prescribed for internal use.

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[1] See *note*, page 92.—TRANSL.

On the 9th, the pulse was 130, and scarcely perceptible; the pains continued; the dulness had not extended; but there were loud consonating râles. The functions of the sensorium were unimpaired.

On the 10th, death occurred from œdema of the lungs.

Autopsy.

The skull-cap was somewhat thickened, and the dura mater was adherent; the longitudinal sinus contained firm coagula. The brain-substance was moderately injected with blood, and in other respects was normal.

The mucous membrane of the pharynx was livid; the œsophagus was normal; the lining membrane of the air-passages was of a faint reddish tint.

The thyroid gland was small; the bronchial glands were slightly melanotic. Both lungs were firmly connected to the walls of the chest by old adhesions. The left lung was œdematous at its upper part, and marked at the apex by several cicatrix-like depressions; inferiorly, it presented a fibrinous exudation, which converted the entire lower lobe into a firm, dense mass, destitute of air. The right lung was œdematous and loaded with pigment.

The pericardium and heart were unaltered, with the exception of the mitral valves, which were slightly thickened.

Several pounds of a faintly opalescent fluid were found in the peritoneal cavity. The diaphragm was pushed upwards as high as the middle of the fifth intercostal space. The upper surface of the liver was firmly adherent to the parietal peritoneum at the epigastrium, and its lower margin to the transverse colon. The organ extended downwards about 7½ inches beyond the base of the ensiform cartilage, and about 4½ inches beyond the margin of the right ribs. The form of the liver was, on the whole, not altered; the right lobe exhibited a transverse furrow, bounded by walls of cancerous nodules; the left lobe was still more diseased; the nodules varied in size from a walnut to a cherry, and some of them presented cicatrix-like depressions in the centre.

The vessels of the capsule of the liver were intensely injected; the glands in the transverse fissure were infiltrated with cancerous matter to a moderate extent. The duodenum was firmly connected by areolar tissue to the gall-bladder and to the lower surface of the liver, more particularly the transverse fissure. The gall-bladder was distended and elastic, and its posterior wall presented a deposit of medullary cancer. The vena portæ contained no coagula; the vena cava was somewhat constricted; its walls were normal. The hepatic artery and the bile-ducts were much dilated.

The spleen was 5½ inches long, 3 inches broad, and 1½ inch thick. The capsule was somewhat thickened, and the parenchyma anæmic.

The stomach presented numerous ecchymoses; the small intestine was very contracted; the mucous membrane of the cæcum was tumid.

The pancreas and retro-peritoneal glands were free from disease.

The kidneys were found to be in the third stage of Bright's Disease; their outer surfaces were granular, and the cortical substance atrophied.

The bladder was very contracted, and presented a diverticulum at its base. The uterus and ovaries were atrophied.

The nerves and muscles of the paralyzed right upper arm were normal; there was no enlargement of the axillary glands.

OBSERVATION No. VI.

Dyspepsia.—Jaundice.—Emaciation.—Painful, Nodulated Enlargement of the Liver.—Diarrhœa.—Exhaustion.—Death.

Autopsy:—Jaundiced Discoloration of Dura Mater, Air-passages, Endocardium, and Kidneys.—Cancerous Nodules in the Liver, very vascular, and some of them depressed in the centre and reticulated.—Constriction of the Portal Vein and of the Hepatic Duct by means of bands of connective tissue.—Fibrinous exudations on the mucous membrane of the Ileum and Rectum.

Elizabeth Penshorn, a shoemaker's wife, aged 68, was admitted into Hospital, on June 4th, and died on June 18th, 1856. The patient's previous health had always been good, when, in the autumn before admission, she noticed, on stretching herself, a somewhat painful tumor in the right hypochondrium; in March her appetite fell off; eight weeks before admission, jaundice made its appearance, which at the time of admission was intense. The strength failed; shortly before admission diarrhœa supervened; the emaciation advanced rapidly. Two inches below the margins of the right ribs, the hard edge of the liver was found passing into a rounded, moderately painful prominence; several small, equally painful nodules could also be felt to the left, in the epigastrium.

The patient was ordered to take Tincture of Nux Vomica, Red Wine, Broth, &c.

The diarrhœa did not abate; the patient's strength diminished more and more, until at length after a protracted agony, death ensued on the 18th.

Autopsy, 8 *hours after death.*

The dura mater was somewhat thickened and of a yellow color; the brain was pale and its consistence was diminished.

The thyroid gland contained small cysts filled with colloid matter; the bronchial glands were normal; the mucous membrane of the air-passages presented a pale-yellowish tint.

The lungs were anæmic at their upper part; inferiorly, they were œdematous and loaded with blood; but in other respects they were normal.

The endocardium was of a bright jaundiced color; the valves were a little thickened; there was slight atheroma of the aorta, and the blood was firmly coagulated.

The mucous membrane of the stomach was slightly swollen, and, at some places, hyperæmic.

On slitting open the duodenum, the openings of the pancreatic duct and ductus choledochus were found to be pervious. The lining membrane of the small intestine was intensely hyperæmic, and towards the ileo-colic valve presented uniform velvety-redness, with small deposits of recent exudation. The mucous membrane of the whole of the large intestine was tumid and recently injected, especially that of the rectum; it was covered with a moderate amount of recent exudation, but nowhere presented any loss of substance.

The spleen was small; its capsule was thickened, and its parenchyma dark and tenacious.

The upper surface of the liver presented numerous cancerous nodules, up to the size of a four-groschen piece ($\frac{9}{10}$ Eng. inch in diameter), which were for the most part umbilicated on their free surface, and which in their interior were found to be partly hyperæmic, and partly reticulated and bright-yellow. At the margin of the right lobe, in the region of the gall-bladder, was a cartilaginous mass of cancerous infiltration, measuring several inches in diameter, and extending through the entire thickness of the liver. The serous envelope was connected in every direction with the duodenum, the sigmoid flexure and the pancreas, by numerous adhesions containing blood-vessels; and by means of the tough connective tissue of these adhesions the hepatic duct and the portal vein were somewhat constricted, the former to such an extent that the branches of the bile-ducts were distinctly enlarged and filled with muco-bilious fluid. The hepatic parenchyma was soft and deeply jaundiced.

The gall-bladder was divided into two compartments, in each of which a dark concretion was impacted.

The kidneys were of normal size, but of a yellow color.

The Fallopian tubes and ovaries were adherent to the uterus.

Observation No. VII.

Intermittent Fever of four weeks' duration.—Dyspepsia, Nausea, Vomiting.—Jaundice without decoloration of the Fæces.—Painful swelling of the Liver, with a smooth upper surface.—Fluid effusion in the abdominal cavity.—Death from Exhaustion.

Autopsy:—Numerous Cancerous Nodules in the Liver.—Cancer of the mucous membrane of the Bile-ducts and Gall-bladder.—Enlargement of the left division of the Hepatic Duct, the branches of which were filled with an ichorous fluid and tubular coagula.—Bloody effusion in the peritoneal cavity.

Rosine Dittkowitz, a widow, aged 54, was admitted on May 6th, and died on June 14th, 1856. A year before, she had an attack of quotidian fever, which lasted four weeks; but she had never suffered from any other disease. Her present illness commenced in March, 1856; she first experienced a feeling of tightness at the epigastrium, and nausea. Sometimes she vomited, but never brought up any blood; her appetite and strength diminished, so that four weeks before admission she was obliged to take to her bed.

Fourteen days before, jaundice made its appearance, which still continued at the time of admission; the stools were tinged brown, and the urine contained a large quantity of bile-pigment. The liver projected about two finger-breadths beyond the margins of the right ribs; it was hard, but its surface was smooth and tender upon pressure; the extent of dulness was not essentially increased. The spleen was slightly enlarged, and could be felt at the margin of the ribs. The heart and lungs were healthy. The tongue was coated gray; the appetite was completely wanting.

Infusion of Rhubarb with Tincture of Orange Peel and Acetic Ether was prescribed.

The stools afterwards assumed a reddish-brown color and clay-like consistence, but no blood corpuscles could be detected in them. The jaundice remained stationary; the patient became emaciated; and suffered from great pain in the region of the liver, which was relieved by warm cataplasms; some fluid collected in the abdomen; this symptom was followed by a still further diminution of the patient's strength, and by œdema of the feet. The hard margin of the liver slowly became more prominent, and small irregularities on its surface were gradually developed in the epigastrium.

On June 14th, death from exhaustion ensued.

Autopsy, 7½ hours after death.

Skull-cap smooth; dura mater intensely jaundiced; serum of a somewhat yellowish tint beneath the arachnoid. Brain substance firm and anæmic.

Thyroid gland pale; bronchial glands melanotic; air-passages of a pale-yellow hue. Lungs dry and emphysematous; lower lobes very œdematous.

The pericardium contained a small quantity of serum; the blood was loosely coagulated; the endocardium was intensely yellow; the valves were slightly thickened; the muscular tissue was normal.

Œsophagus pale; mucous membrane of stomach yellowish; about the middle of the great curvature there was a superficial ulcer, the size of a silver groschen (6½ lines in diameter), with a smooth base and sharp margins. The intestines contained grayish-brown fæcal matter; their mucous membrane was everywhere free from disease.

There was a moderate amount of bloody fluid in the sac of the peritoneum. In the neighborhood of the liver and in the Plica Douglasii,[1] there were extensive firm coagula of blood of various dates, and here and there small, very vascular nodules of cancer.

The spleen was firm, dark reddish-brown and somewhat enlarged.

Both surfaces of the liver presented numerous nodules of cancer, from the size of a pea to that of a walnut, some of which were still covered by layers of the hepatic tissue, and were consequently perfectly smooth, and but slightly prominent. The parenchyma of the liver was of a dirty brownish-green color and soft; its cut surface everywhere presented bile-ducts, exhibiting the phenomena of suppuration, many of which were furnished with saccular dilatations, and the mucous membrane of which was covered with cancerous excrescences. These excrescences were most numerous at the entrance of the left branch of the hepatic duct; and here they had occasioned so great an obstruction, that the ducts in the left lobe were dilated so as to measure 4 centimètres (1·575 Eng. inch) in circumference; these ducts were filled with a dirty-brown juice and tubular coagula of the same color; their walls appeared thin and smooth. The cancerous excrescences extended along the bile-ducts to the gall-bladder, the walls of which were infiltrated with cancerous matter. The gall-bladder contained two concretions, each the size of a hazel-nut. The dirty-brown pultaceous substance could be squeezed through the ductus choledochus into the duodenum.

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[1] The *Plica Douglasii* is the bottom of the pouch-like fold between the uterus and rectum.—TRANSL.

A gland as large as a hen's-egg, infiltrated with cancerous matter, was found lying between the gall-bladder and the duodenum, and adherent to both. The pancreatic duct was enlarged.

The kidneys were of normal size, and of a deep jaundiced hue, with dark brownish-green streaks; their consistence was normal.

The bladder was pale and empty.

The uterus was somewhat large, and the parenchyma pale. The ovaries were atrophied.

Observation No. VIII.

Persistent Cough.—Signs of a cavity at the Apex of the Right Lung.—Liver painful and nodulated, but not enlarged.—Tumefaction of Spleen.—Ascites.—Appetite good.—Constipation.—Paracentesis.—Death from exhaustion.

Autopsy:—Bones of Cranium thick.—Dilatation of Bronchi and induration of the Apex of the Right Lung.—Mitral Valves thickened and partly calcified.—Cicatrices on the Soft Palate, and at the entrance to the Vagina.—Granular induration of the Liver in conjunction with Syphilitic Cicatrices and Cancerous Nodules.—Waxy Spleen.—Cicatrized Ulcers of Stomach.

Charlotte Pest, wife of a pavier, aged 59, was admitted into Hospital on June 23d, and died on Sept. 19th, 1854.

The patient was a well-nourished individual, with a well-developed thorax; she had suffered from cough for some years, with gradually increasing dyspnœa, but had never expectorated any blood. Eight years before she had repeated attacks of intermittent fever. Several weeks before admission, she experienced pains in the abdomen, and observed a swelling in that region.

The left side of the thorax expanded more fully than the right; over the apex of the right lung there was a muffled tympanitic sound on percussion, with amphoric respiration; but on the left side of the chest and over the lower part of the right side, there was distinct vesicular breathing. The heart's sounds were normal, both in character and frequency.

The hepatic region was painful, and the nodulated hard margin of the liver could be felt projecting beyond the margin of the ribs. The organ measured 17 centimètres in the sternal line, 10 in the mammary line, 12 in the axillary line, and 7 in the scapular line ($6\frac{7}{10}$, 4, $4\frac{3}{4}$, $2\frac{3}{4}$ Eng. inches). The abdomen contained a moderate amount of fluid; the bowels were confined; the stools, which were brought away by means of Aloes, were of a dark color; the urine was scanty; the splenic dulness was moderately increased; appetite good; no febrile symptoms.

During the progress of the disease, no alteration took place in the acoustic phenomena presented by the right lung; the cough was slight, and the expectoration muco-purulent. The heart's action was sometimes irregular. The appetite continued moderate, and the bowels were kept sufficiently open by means of Aloes. The urine was always scanty, dark, and acid.

The ascites increased so as to embarrass the respiration, and with the object of relieving this, paracentesis was had recourse to on the 26th of July. The fluid which was drawn off was clear and transparent. Large, painful nodules, which were obviously of a cancerous nature, could be felt upon the right lobe of the hard liver.

Notwithstanding careful dietetic management, the patient's strength rapidly declined. The medical treatment consisted chiefly in the employment of tonics, more particularly the Extract of Cinchona, together with Rhubarb and Aloes, to keep up the action of the bowels. Attempts were made to diminish the ascites by means of drastic purgatives, but, after a short time, they were of necessity abandoned, as the digestion began to suffer from them.

Death ensued on September 19th, after a protracted agony.

Autopsy, on September 20th.

Great œdema of the lower extremities. Skull-cap very thick and dense. Dura mater firmly adherent to the bone. Arachnoid opaque at many places; a moderate amount of subarachnoid fluid; pia mater hyperæmic; its vessels somewhat tortuous. Cerebral substance of normal consistence; bloody points somewhat increased.

Thyroid gland normal. Slight œdema of the aryteno-epiglottidean ligaments. Intense injection of the mucous membrane of the trachea and bronchi.

Two pounds of clear fluid were found in the left pleural cavity; the left lung was emphysematous and anæmic at its upper part, inferiorly it was compressed. The right lung was firmly adherent at its upper part; near the anterior surface of the upper lobe there was a cavity the size of a hen's egg, on the walls of which band-like trabeculæ were observed; the surrounding pulmonary tissue was, over a considerable extent, dense, destitute of air, of a grayish-black color, without any trace of tubercle, and contained very hyperæmic dilated bronchi. The lower lobe of the right lung was emphysematous anteriorly, hyperæmic and œdematous posteriorly.

The pericardium contained some serous fluid; several, opaque-white spots were observed upon the surface of the right ventricle. The right auricle was enlarged; the right ventricle and valves were normal. The left ventricle was of a globular form; its walls were firm; the mitral valves were thickened; the chordæ tendineæ were at several places adherent and shortened; calcareous deposits were found on the lower surface of the long flap. The left auricle was enlarged and filled with loosely coagulated blood. The aortic valves and aorta were normal.

The abdominal cavity contained a large quantity of bright-yellow, clear fluid; the peritoneum throughout was of a slaty-gray hue, and thickened.

The spleen was somewhat enlarged, wrinkled, dry, brown, rigid, and of increased consistence (*Speckmilz*).

The liver was reduced in size. The upper surface of the left lobe presented a number of uniform nodules, the size of peas; the serous covering was opaque; the parenchyma was firm, brown, and granular; the margins of the organ were sharp. In the right lobe were found deep depressions and likewise numerous nodules, the most of which were white; at the sharp margin there was a nodule as large as a walnut, and another similar one on the concave under surface.

On section, the parenchyma of the liver was found to be white, and unusually firm, and to divide under the knife, like fibrous tissue; at a few places only could the remains of a brown, firm, granular hepatic tissue be observed. The white tissue, on closer inspection, presented a reticulated arrangement of yellowish-white bands, which consisted of firm connective tissue, and enclosed dull-white spaces, which for the most part were made up of an amorphous accumulation of fat, but here and there likewise contained the elements of cancer. The large prominent nodules were chiefly composed of the unequivocal elements of cancer. These nodules presented on section, a homogeneous gray-white appearance, were slightly resistant, and yielded a large quantity of milky juice.

The gall-bladder contained an abundance of bright-brown fluid bile.

Two white cicatrices were observed on the velum palati; the mucous membrane of the gullet was injected; the stomach was collapsed, and its posterior wall presented several radiated cicatrices, which could even be observed from the serous surface. The mucous membrane throughout was thickened, of a slaty gray hue, and covered with mucus tinged with bile.

Intestinal canal normal. Mucous membrane of the cæcum slaty-gray; fæces bright-yellow and clay-like.

Pancreas firm, small, gray, and granular.

Kidneys somewhat atrophied; their outer surface, however, smooth; their consistence increased, without any obvious infiltration. Bladder normal.

Ovaries normal. There was a vascular polypus in the fundus of the uterus: uterine tissue in other respects normal. The cicatrix of a chancre was observed at the entrance to the vagina.

This case was remarkable, inasmuch as cancer was developed in a liver, which presented the signs of syphilitic inflammation together with induration.

OBSERVATION No. IX.

Painful Tumor on the Right Hypochondrium, afterwards extending into the Epigastrium.—Disordered Digestion.—Emaciation.—Symptoms of Pleurisy on the Right Side.—Death.

Autopsy:—Soft and hard Cancerous Nodules in the Liver.—Gall-stones.—Purulent Exudation in the right Pleural Cavity.—Cancerous Nodules in the Right Lung.

Christiane Siegelkorn, shoemaker's wife, aged 59, was admitted on the 17th of October, 1856, and died on January 1st, 1857.

Her previous health had always been good. Three months before admission, she noticed a swelling in the right hypochondrium, which gradually became enlarged and painful, whilst at the same time her appetite fell off, and her strength failed.

On admission, a hard, nodulated tumor, the size of a fist, and tender upon pressure, could be felt beneath the margin of the right ribs; it was obviously connected with the margin of the liver. The emaciation was remarkable; the color of the skin and of the urine was normal. Compound Tincture of Cinchona was prescribed.

A painful hardness was likewise gradually developed in the epigastrium. Various symptoms of indigestion manifested themselves; the patient's strength failed more and more, and her feet became œdematous.

On December 30th, febrile symptoms appeared, accompanied by pains, with dulness and disappearance of the respiratory murmur on the right side of the chest. Rapid collapse supervened, and terminated in death on January 1st.

Autopsy, on January 2d.

The brain and its membranes were normal.

The thyroid gland was hypertrophied. The lining membrane of the air-passages was pale. The lungs were firmly adherent. The right pleural cavity contained a purulent, flaky exudation, extending as high as the third rib, and compressing the lower lobe of the lung, which, in addition to being collapsed, contained several small nodules of cancer. The left lung was slightly œdematous.

The valves of the heart were slightly thickened.

The liver extended about 5½ inches beyond the base of the ensiform cartilage. It was firmly connected superiorly with the diaphragm, and inferiorly with the coils of intestine. The right lobe presented a deep, tight-lace fissure, and in the partially detached portion of the organ, large masses of hard cancer were particularly abundant (Fig. 13).

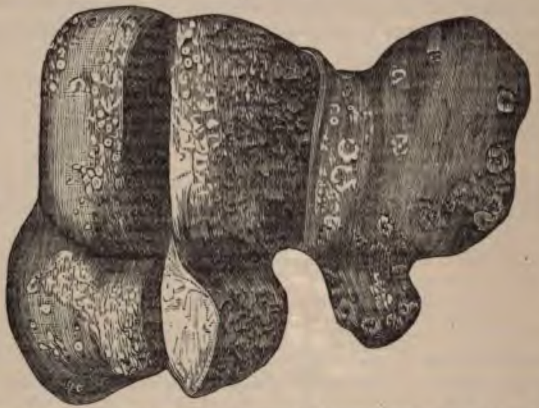

FIG. 13.—Cancer of the liver. The cancerous matter is deposited for the most part in the form of disseminated nodules, and many of the nodules projecting from the surface are depressed in the centre. A deep tight-lace fissure may be observed in both the right and the left lobes. The cancerous matter is seen to be particularly abundant in the portion of the right lobe which is semi-detached.

The right lobe was 8¼ inches long, 6½ inches broad, and 3½ inches thick. The left lobe was 5½ inches long, and 4 inches broad.

Some of the cancerous nodules were of very firm consistence, and here and there tinged yellow, others were softer and lighter. Numerous small nodules were found in the left lobe. The gall-bladder contained several concretions, together with a little grayish-yellow mucus. A few of the bile-ducts were enlarged and filled with fluid bile.

The spleen was 3½ inches long, 2 inches broad, and 11 lines thick, pale, and moderately firm.

The mucous membrane of the stomach was pale; the larger vessels of the cæcum were injected, but in other respects the intestines were normal.

The pancreas was small and shrivelled.

The kidneys were anæmic. The mucous membrane of the bladder was pale. The uterus was small and atrophied, as were likewise the ovaries.

Observation No. X.

Persistent derangement of digestion.—Liver considerably enlarged, but free from pain, and its surface smooth.—Rapid Collapse.—Death.

Autopsy:—Liver very large and heavy, and containing numerous yellowish and blackish nodules.—Isolated nodules of cancer in the Retro-Peritoneal Glands, the Lungs and the Pleura.—The tumors composed, for the most part, of connective tissue-cells.—Old thrombus in the left branch of the portal vein.

History.—Johanna Spanier, widow of a journeyman bricklayer, aged 50, was admitted into All Saints' Hospital on October 4th, 1860. She stated that during her youth, she had always enjoyed good health. She had never suffered from intermittent fever, and had never been infected with syphilis. She was married at the age of 22, and had subsequently eight living children. She ceased to menstruate in her 43d year. From this date she complained of pain from time to time in the region of the stomach; her appetite, however, was good; she had no vomiting and no distention of the abdomen. In her 45th year, she passed through an attack of typhus fever in Hospital. She was discharged perfectly cured, and was again able to do hard work. Still the pains in the region of the stomach continued, but were unaccompanied by any other disturbance. The patient did not grow thin, nor did her strength fail. In the course of the summer of 1860, the pains increased to an intense degree, and were particularly severe when the patient stretched her body. At the same time, she lost her appetite, and became emaciated. It was in August of this year that the patient first noticed that her abdomen was hard and distended. From this time she was obliged to leave off work, and to apply for relief at my Clinique.

State on admission.—The patient was only slightly emaciated, and nowhere presented a jaundiced hue. The thorax was flattened; anteriorly, on the right side, it yielded a clear sound on percussion as far down as the upper margin of the sixth rib, where the dulness of the liver commenced. On the left side, there was likewise nothing abnormal. The cardiac dulness was not increased. The impulse of the heart could be felt in the sixth intercostal space, in the left mammary line; the sounds of the heart were normal. Posteriorly, a clear percussion sound and vesicular breathing could be made out over the whole of the surface bounded by the normal limits of the lungs.

The hepatic dulness commenced below the nipple, at the upper margin of the sixth rib. The absolute dulness extended downwards to 4 centimètres (1½ English inch) below the umbilicus; from this to the arch of the pubis percussion yielded a dull sound, and strong percussion a muffled tympanitic sound. Immediately below the umbilicus, the hepatic dulness extended transversely across the mesogastrium into the left hypochondrium. In the left half of the meso- and hypo-gastric regions, the sound on percussion was completely tympanitic.

Simple inspection showed a great bulging, extending over the right half of the abdomen and the whole of the epigastric region.

On palpation of the abdomen, an increased resistance was felt below the edge of the right ribs. The abdominal walls were easily moved over the tumor, and were not tense; beneath them could be felt a firm tumor, which extended into the hypogastric region, and terminated here close to the arch of the pubis. This tumor completely filled the right half of the abdomen. The same tumor could be traced by means of palpation, stretching immediately below the umbilicus, transversely across the mesogastrium to the anterior extremity of the eleventh left rib. The tumor was divisible into a right large, and a left small lobe, and its form and situation corresponded to those of an enormously enlarged liver.

The surface of the tumor was everywhere smooth, and nowhere marked by irregularities. The abdominal walls were so lax and yielding, that both lobes of the liver could be seized with the hand. The margins of the right large lobe were blunt and rounded, while, on the other hand, those of the left small lobe were sharp and attenuated, as is usually the case with waxy liver. The tumor was easily movable, and was still further depressed when the patient took a deep inspiration. Its consistence was everywhere uniformly firm; no soft or fluctuating places could be felt. No pain was caused even by the strongest pressure upon the tumor, except over a space the size of a small plate over the ensiform cartilage, where pains of moderate severity were produced on pressure.

The splenic dulness commenced in the axillary line, and extended from the lower border of the ninth rib, down to the upper border of the eleventh rib. The tympanitic stomach sound could be discovered between the splenic and hepatic dulness. The left half of the mesogastric and hypogastric regions was soft, and presented nothing abnormal.

On examination *per vaginam*, the uterus was found to be of normal size, and not displaced. The pelvic cavity was free from disease. The situation of the uterus remained unaltered on moving the tumor, or on pressing it downwards.

The patient had no difficulty in micturition. The urine was dark-brown, and free from albumen. The bowels were confined. The appetite was bad, and the tongue covered with a gray coat. Pulse 76; respirations 20.

After the administration for several days of the Tincture of Rhubarb, the appetite returned, and the patient felt somewhat better. She passed only small quantities (1¼ pound in 24 hours) of dark urine, which deposited a large amount of sediment. This sediment consisted for the most part of lithates; a few pus corpuscles were discovered in it, on microscopical examination. Some days afterwards, the patient began to complain loudly of severe pains in the back, but the enlarged liver still continued free from tenderness on firm pressure. The pains increased in severity, and could scarcely be relieved by means of morphia; they were always most violent during defæcation. The stools were colored with bile, and firm. The patient grew rapidly weaker, and death ensued under symptoms of general collapse.

Autopsy, 19 *hours after death.*

The body was only moderately emaciated. The right lower extremity was somewhat œdematous. The skin was pale and free from any jaundiced tint.

The sinuses of the dura mater were distended with blood. There was a little serum in the cavity of the arachnoid, and likewise in the ventricles. The brain-substance was pale and firm.

A few enlarged veins were observed in the mucous membrane of the œsophagus.

The mucous membrane of the larynx and trachea was of a yellowish color, but otherwise normal. The bronchial glands were not enlarged. The margins of both lungs, but particularly of the right, were very emphysematous; the lower lobes were infiltrated with serum. On the pleural surface of the lower lobe of the left lung was a tumor the size of a pea, which could be easily peeled off from the pleura. The consistence of this tumor was firm, and, on section, it presented a grayish-white velvety appearance; on microscopic examination, it was found to contain connective tissue, but very few cells. Several little masses, the size of a pin's head, were likewise observed in the lower lobe of the left lung, imbedded in the pulmonary tissue; they could be picked out with ease from the pulmonary tissue, and exhibited under the microscope the same characters as those of the nodule above mentioned. No abnormal deposit could be discovered in any other part of the lung.

Heart 3½ inches long, and 3 inches broad. Muscular tissue of heart flabby; valves and orifices normal.

On opening the abdomen, the enormously enlarged liver was seen stretching down into the pelvis. Its surface exhibited a number of small black and yellow tumors, which, however, were not elevated above the level of the surrounding tissue, so that the gland appeared smooth, and was nowhere nodulated.

The liver weighed 13⅗ pounds. The right lobe measured 14 inches from before backwards, and 9 inches in breadth; its greatest thickness amounted to 5 inches. The left lobe measured 9 inches from before backwards, and 5 inches in breadth, while its greatest thickness was 3 inches. On the smooth outer surface of the organ could be seen the above-mentioned black and yellow nodules, varying in size from a hemp-seed to that of a sugar-pea; they were partly isolated and partly aggregated in groups. The hepatic tissue between these numerous nodules was of a bright-yellow, partly orange-yellow, color, and presented delicate outlines of the lobules, together with reddish streaks, which were due to the vascularity at some places being increased. The suspensory ligament presented a rich network of veins.

The gall-bladder was empty, and the bile-ducts were not compressed.

On making a fresh section of the hepatic tissue, it was found to contain a moderate amount of blood, and at some places to present a jaundiced tint; its consistence was firm. From the cut surface of the tumors, an opaque juice, mixed with blood, could be squeezed out; in the case of the dark-colored nodules, the juice presented a brownish-black aspect.

The left branch of the portal vein contained an old, soft, grayish-yellow coagulum, joined on to which was a recent coagulum of a dark-violet hue.

The spleen was 3½ inches long, 2½ inches broad, and ½-inch thick. Its capsule presented an opaque fibrous patch (*Sehnenfleck*). The parenchyma was firm and anæmic.

The mucous membrane of the stomach was colored yellow, and at some places hyperæmic, but it was free from erosions.

Numerous veins were observed in the mucous membrane of the small intestine; the follicles were not enlarged. The large bowel contained some firm fæces, colored with bile. There were no deposits in the mesentery.

Behind the pancreas, two of the retro-peritoneal glands were infiltrated with cancerous matter; they were as large as half a walnut, and of a grayish-white color.

The uterus and ovaries were atrophied, but were in other respects normal. The kidneys and bladder were unaltered. The right iliac and crural veins contained a small coagulum.

On microscopic examination, the yellow nodules in the liver were found to be composed for the most part of connective tissue-cells, of various forms, a few only approaching to a rounded or oval form, with a small nucleus from ·005 millimètre to ·0075 millimètre. By far the largest number of the cells exactly resembled the caudate corpuscles of recently developed connective tissue. They were elongated corpuscles of various lengths, some of which were provided with remarkable thread-like prolongations from 0·005 to 0·008 millimètre in breadth. The narrowest only of the cells were destitute of nuclei; all the rest contained a single oval nucleus, or two rounded nuclei lying in the centre, close to one another, and undergoing subdivision. All of the nuclei contained one or two very small nucleoli, scarcely amounting to 0·002 millimètre in diameter.[1] The large nuclei and nucleoli of ordinary cancer cells could nowhere be discovered in the numerous preparations which were examined. In the pigment-cells of the blackish nodules, the black coloring-matter assumed the form of small blackish molecules (Fig. 15). At some places the tissue presented the character of connective tissue in a still more marked degree, consisting of elongated fibres and caudate corpuscles destitute of nuclei.

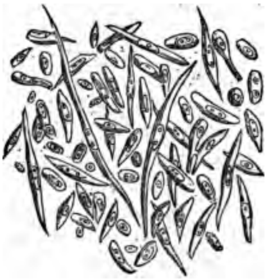

FIG. 14.—Cells resembling those of connective tissue, from cancerous deposits in the liver.

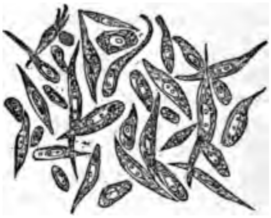

FIG. 15.—Cells from other cancerous deposits in the same liver containing blackish pigment.

The hepatic cells were throughout of normal character, except that some were of a uniform bright-yellow color from bile-pigment, whilst only a few contained an increased number of oil-globules.

Remarks.—This case was interesting in various ways. The elementary structure of the morbid growths was essentially different from that of the forms of cancer hitherto recorded, and resembled that of the cellular connective tissue tumors (Fibroid Tumors) or sarcomata. It resembled cancer in its multiple character, in its extension by the lymphatic glands, and in its involving distant organs. The diagnosis of the nature of the disease in the liver was particularly difficult, inasmuch as the more obvious pathological changes in the gland differed essentially from those produced by cancer. The organ retained its ordinary smooth and even surface, and the form of the gland remained unaltered. The nodulated protuberances and irregularity of form indicative of cancer of the liver, were altogether wanting, while the characteristic tenderness of cancerous tumors was likewise at no time complained of.

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[1] One millimètre is equal to ·039371 Eng. inch.—TRANSL.

The uniform, smooth, painless swelling of the liver, without jaundice, and without ascites, would of course have led at once to the supposition of waxy degeneration, had not the antecedents which predispose to this form of disease, as well as the tumefaction of the spleen and the albuminuria, which ordinarily accompany it, been wanting.

The uniform hardness, the absence of fluctuation, and the unaltered form of the gland excluded the notion of hydatids.

The extraordinarily rapid increase of the cachexia, in the absence of any other source of derangement, was the main ground for attributing the enlargement of the liver to cancer.

II.—CANCER OF THE LIVER IN CONJUNCTION WITH CANCER OF THE STOMACH.

OBSERVATION No. XI.

Pains in the Epigastrium.—Disordered digestion.—Slight Jaundice.—Liver enormously enlarged, slightly tender, and covered with fluctuating Tumors.—Fluid effusion in the abdominal Cavity.—Rapid increase of the Ascites and sudden Collapse.—Death.

Autopsy:—Numerous deposits of Medullary Cancer in the Liver.—Fatty degeneration and softening of the Hepatic Tissue.—Rupture of fungating excrescences through the Capsule of the Liver, with extravasation of blood into the Peritoneal Cavity.—Cancer of the left division of the Portal Vein, and a Thrombus in the right division.—Angular compression of the Vena Cava.—Enlargement of the left branch of the Hepatic Duct.—Cancer of the posterior wall, and of the lesser curvature of the Stomach.—Compression of the Splenic Vein, which contained a decolorized Thrombus.—Slight enlargement of the Spleen.—Patches of Ecchymoses in the Mesentery.

Gottlieb Günther, a day-laborer, aged 51, was admitted into All Saints' Hospital on May 24th, 1854, and died there on June 7th. The patient, who was a large, powerful, tolerably well-nourished man, without any appearance of anæmia, had already in 1850 an attack of jaundice which lasted several weeks, and was accompanied by pains in the right side of the abdomen. After this, he enjoyed uninterrupted good health, and was able to work hard until fourteen days before admission; his appetite till then had been good; he had no pains after eating; his bowels had been regular, and he had been able to wear a tight belt round the abdomen, without any discomfort.

For fourteen days he had experienced a constant, burning, pinching sensation at the epigastrium, which was always worse after taking food, and which was accompanied by failure of appetite and constipation.

The conjunctiva presented a slight yellowish tint. The urine was scanty; it contained some bile-pigment but no albumen. Nothing abnormal could be discovered in the lungs or heart. The pulse was of normal frequency; there was no elevation of temperature. The tongue was covered with a yellowish coat; the abdomen was distended; the right epigastric vein was somewhat enlarged, and fluctuation could be felt in the lower part of the abdomen. An elastic, arched, tolerably uniform tumor could be felt in the epigastrium, which terminated by a sharp margin at the umbilicus; this sharp margin could be pushed up, whereupon another elastic prominence was felt lying deep and in an upward direction. The edge of the tumor could be traced downwards and to the right, until it was no longer appreciable by palpation, on account of the accumulation of fluid in the abdominal cavity. Over the margin of the tumor, and especially immediately below it, in the centre of the abdomen, percussion yielded a full tympanitic sound; but in the lateral regions the percussion sound was dull. The sharp margin moved downwards and upwards with inspiration and expiration. The dulness extended upwards to a level with the fourth rib, so that close to the sternum its perpendicular length was 8 inches. This enormously enlarged liver was not particularly tender when touched.

The spleen was not much enlarged, and it lay far back.

The stools were tolerably light, at one time semi-fluid, and at another formed. The patient's only complaints were weakness, severe pinching and burning in the epigastrium, and increased thirst. He never suffered from nausea, vomiting, or colicky pains. Tincture of Rhubarb with Extract of Belladonna was prescribed.

The jaundice gradually increased; the skin became yellow; on the 4th of June the patient began to complain of pains in the abdomen; his strength failed, and the feeling of tightness at the epigastrium increased. Dry-cupping, Cataplasms and Phosphoric Acid were prescribed.

The pulse was 96, small and soft. The fluid in the abdomen increased; the patient occasionally suffered from eructations, but had no vomiting.

On the 6th the lower extremities were swollen; the weakness had increased. The pulse was very small and the hands cool; the effusion in the peritoneal cavity had considerably increased during the last 24 hours. In the evening the patient became unconscious; the pulse was inperceptible; and the extremities were cold.

Death occurred at 5 A. M. of the 7th.

Autopsy, 7 hours after death.

Body large, somewhat jaundiced; lower extremities very œdematous; numerous patches of *post-mortem* lividity.

Skull-cap thick, compact, and anæmic. The longitudinal sinus contained a little fluid blood; the dura mater was somewhat opaque, and of a slight yellow hue. The cerebral membranes contained a moderate amount of blood, and there was half-an-ounce of serum in the occipital fossæ. The brain-substance was anæmic and of normal consistence.

The mucous membrane of the larynx and trachea was pale. The thyroid gland was small and firm. The bronchial glands were melanotic and somewhat enlarged.

The pleural cavities contained only a little serous fluid. The lungs were non-adherent; the margins of the upper lobes were emphysematous; the lower lobes were rather œdematous and condensed from hypostasis.

The pericardium contained an ounce of clear fluid. The size of the heart was normal; the valves were sound, but colored yellow, as was likewise the lining membrane of the aorta.

On opening the abdominal cavity, there escaped about twelve pounds of a dark-red, bloody fluid, mixed with flaky coagula. The greatly enlarged liver first came into view. It extended as high as the fourth rib, and was opposed to the anterior wall of the abdomen, over a space measuring 8 inches perpendicularly. The left lobe was adherent to the lesser curvature of the stomach, and the right lobe to the transverse colon, which was distended with gas. The margin of the left lobe was sharp and easily bent over; that of the right lobe was rounded. The convex surface of the left lobe presented four confluent, nodulated, soft tumors, the size of hens'-eggs, the surfaces of which were covered by numerous large ramifications of blood-vessels; these tumors had compressed the small remains of the glandular tissue, and projected as flat prominences from the under surface of the left lobe. The tumors were of a sulphur-yellow color and reticulated, and were so soft as to fluctuate. The bile-ducts, which permeated the left lobe, were large, and filled with pale-green bile. The left main division of the portal vein was filled with grayish-white cancerous matter. This vessel could be traced as far as its small branches, and, in addition to numerous compound granular cells, contained large cancer cells, with one or several nuclei. The cancerous growth in the portal vein was attached by a broad base to the infiltrated venous wall, close to where the vessel divided into its two main branches.

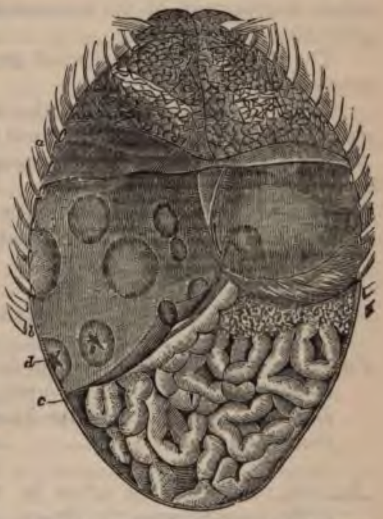

FIG. 16.—Disseminated cancer of the liver. The liver is much enlarged and compresses the lungs, while below it is adherent to the transverse colon and to the lesser curvature of the stomach. The cancerous nodules are seen projecting from the outer surface. Two, at *d*, have burst through the peritoneal envelope of the gland.

A number of similar fluctuating nodules, up to the size of a duck's-egg, projected from the surface of the right lobe, more especially from its posterior blunted margin. On sections of the organ, several similar nodules, completely softened in the centre, came into view; each contained a cavity filled with a whey-like fluid. At the right extremity of the liver (Fig. 16 *d*), two nodules were observed which had perforated the peritoneal envelope, the cancerous mass growing into the peritoneal cavity in the form of soft cauliflower-like excrescences, which were covered with recent blood-coagula. These nodules must have been the source of the large quantity of blood, which was extravasated into the abdominal cavity.

The blood contained a quantity of white granules (*körnchen*), consisting of colorless cells and lanceolate crystals.

Numerous cancerous nodules were likewise seen projecting from the under surface of the liver. Two of these nodules compressed the vena cava, immediately before its junction with the two hepatic veins, in such a manner that the vessel presented a funnel-shaped form. The lymphatic glands in the fissure of the liver were not enlarged, but in the head of the pancreas there was a soft, rounded, cancerous tumor, the size of a hen's-egg, which pressed firmly upon the splenic vein. This vessel was occluded by a firm old plug, in which were found numerous white granules (*körnchen*), the size of millet seeds, composed of colorless blood corpuscles. The ductus choledochus was dislocated from its proper course, and was enlarged to double its normal size.

The gall-bladder was contracted, and contained green viscid bile.

The spleen was slightly enlarged, and firmly adherent to the diaphragm. Its parenchyma was dark, and its consistence somewhat increased.

The pancreas was shrivelled, flabby, and small.

The stomach, which was adherent to the left lobe of the liver, was laid open from the cardia. On the posterior wall, commencing close to the cardia, was a vascular, cauliflower-like mass of cancer, 3½ inches in diameter, and 4 lines thick. The serous membrane of the lesser curvature was elevated by a flattened, white nodule, the size of a pigeon's-egg, which, however, was related in no way to the cancer of the liver. The adhesions were, for the most part, simply ligamentous, and easily torn across. The remaining portion of the mucous membrane of the stomach was of a slaty-gray hue, and tumid.

The peritoneum presented several ecchymoses in the mesentery and mesocolon.

The mucous membrane of the intestinal canal presented nothing abnormal. The fæces were of medium consistence, and moderately colored.

Both the kidneys were somewhat firm; their capsules were adherent, and their outer surface smooth. The renal tissue was slightly jaundiced. The urinary bladder and prostate were normal.

The mesenteric and retro-peritoneal glands were healthy.

OBSERVATION No. XII.

Pains in the Left Hypochondrium, without any dyspeptic symptoms.—Rapid emaciation.—A hard, tender Tumor at the margin of the Left Ribs, and a similar Tumor on the Right Side.—Sudden Death from Syncope.

Autopsy:—Cancerous ulcer in the lesser curvature of the Stomach.—Adhesions between the Stomach and the under surface of the Liver.—Cancer of the Cœliac and Hepatic Glands, without compression of the Bile-ducts or Hepatic Vessels.—Numerous Cancerous Nodules in the Liver, some of them as large as a fist.—Slight Peritoneal Exudation, with fibrinous flakes.

Johanna Gläser, widow of a mason, aged 72, was under treatment in the Clinique of All Saints' Hospital from the 7th to the 15th of November.

Until three months before admission, the patient had always enjoyed good health, but since then she had suffered from pains in the left hypochondrium, without any impairment of the appetite, and without nausea or vomiting. Upon admission, the old woman appeared very pale and anæmic; her extremities were cool; pulse 108, and small. The heart and organs of respiration presented nothing abnormal, either in their functions or their physical characters.

A flat, hard tumor, tender upon pressure, could be felt projecting in the scrobiculus cordis, at the margin of the left ribs. Further down, we could feel a sharp margin, convex downwards, beneath which the fingers could be pressed inwards with ease, and on which several small, nodulated tumors could be felt. Following this to the right, a fissure was felt, and still more to the right, close to the false ribs, was another hard, nodulated tumor. The abdomen in other parts was soft and free from pain. There was no jaundice. The urine was pale, and the stools slightly colored.

Tincture of Rhubarb and a strengthening diet were prescribed.

In the night, between the 14th and 15th, the patient suddenly became very weak, and died at half-past 6 in the morning from thorough exhaustion.

Autopsy, 4½ hours after death.

The skull-cap, the brain, and its membranes were very anæmic. The consistence of the brain was normal.

The thyroid gland was pale. The bronchial glands were small. The lungs were slightly adherent; above and in front they were very anæmic; posteriorly they were slightly œdematous.

There were two ounces of serum in the pericardium. The heart was small, and contained a small quantity of firmly-coagulated blood. The valves and muscular tissue were normal.

The œsophagus was pale. The stomach was much bent upon itself, and its lesser curvature was connected to the under surface of the liver by means of a large number of lymphatic glands infiltrated with cancerous matter. On the inner surface, at the middle of the lesser curvature, there was an oval ulcer, 3 inches long, and 2 inches broad, the margins of which were thick from cancerous infiltration, terraced, and sharply cut, while its base was somewhat uneven, with some recent blood-coagula lying upon it.

The small intestine contained reddish-brown and blackish masses; its mucous membrane was pale, as was likewise that of the large intestine, in which gray masses of fæcal matter were found.

The pancreas was surrounded by cancerous lymphatic glands, but was itself free from disease. The mesenteric glands were small.

The spleen was of normal size and consistence; its parenchyma was loaded with dark pigment.

The left lobe of the liver projected into the epigastrium, 4½ inches beyond the margin of the ensiform cartilage, and contained a cancerous nodule, the size of a fist, which extended through its entire thickness. In addition to this, the left lobe, which was much enlarged, contained numerous other smaller nodules; several nodules, of still smaller size, were found in the right lobe. The parenchyma, at other parts, was anæmic, of a uniform brown hue, and of normal consistence. On the under surface of the right lobe, the gall-bladder, which was almost completely destroyed, and only contained a small quantity of whitish mucus, was found to be firmly adherent to the duodenum, while in the fissure of the liver, there was a cluster of lymphatic glands, greatly infiltrated with cancer, and very soft, which, however, did not interfere with the bile-ducts or blood-vessels.

The kidneys were both small, anæmic, and firm. The urinary bladder was pale. The uterus and ovaries were pale and shrivelled.

The abdominal cavity contained a moderate amount of turbid serum, mingled with a few fibrinous flakes.

OBSERVATION No. XIII.

Symptoms of indigestion.—Thin, sometimes Bloody Stools.—Rapid decline.—Extensive nodulated and painful enlargement of the Liver.—Enlarged Abdominal Veins.—Ascites.—Slight Jaundice.—Death under symptoms of pressure upon the Brain.

Autopsy:—Numerous Umbilicated and Fatty Cancerous Nodules in the Liver, which was much enlarged and congested.—Small Cancerous Mass in the posterior wall of the Stomach.—Tumefaction of the Spleen.—Apoplexy of the Pia Mater.

Carl Friefer, boot-cleaner, aged 61, was in All Saints' Hospital from the 10th to the 20th of December, 1856.

The patient had begun to feel ill at Michaelmas, his earliest symptoms having been loss of appetite and strength. His strength had failed to such an extent, that for six weeks he had been confined to bed. For five weeks he had suffered from diarrhœa, the stools being sometimes mixed with blood. His feet had become œdematous, and at the time of admission were much swollen. The abdomen also was distended.

There was considerable emaciation; the patient's appearance was cachectic; the cerebral functions were unimpaired; the cardiac and respiratory symptoms were normal. The abdomen was remarkably distended; the subcutaneous veins over its surface were somewhat enlarged; and the lower half of the cavity was filled with fluid. The hypochondria and epigastrium were occupied by the enormously enlarged liver, the margin and surface of which felt hard, and were furnished with numerous nodules, which were somewhat tender upon pressure. There were two stools daily, which were pultaceous, rather light-colored, passing into gray. The urine was dense, clear, and free from albumen.

The Compound Tincture of Cinchona was prescribed.

The appetite continued tolerably good, but the strength rapidly failed. On the 14th, a slight jaundiced-tint of the skin was observed; the mental powers remained unimpaired.

During the night of the 20th, the patient suddenly became unconscious and restless; stertorous breathing supervened, and death took place at five in the morning.

Autopsy, 6 *hours after death.*

A large quantity of blood escaped, on removing the skull-cap, and also from the sinuses. The cerebral membranes were throughout very opaque from old thickenings. There was an abundant effusion of serum beneath the arachnoid. At the base of the brain, and extending from the commissure of the optic nerves into the right fissure of Sylvius and the adjoining sulci, was a recent extravasation of blood, from one to two lines in thickness, in the substance of the pia mater. Nothing abnormal could be discovered in the surrounding brain-substance, or in the cerebral vessels. The rest of the brain was congested and moist, but in other respects normal.

The thyroid gland was normal. The bronchial glands were melanotic.

The cartilages of the larynx were ossified. The air passages were hyperæmic, and at some places ecchymosed.

The right pleural sac contained a moderate quantity of brown serum. The upper lobe of the right lung was œdematous and congested; the lower lobe was compressed. The left lung was adherent, and its parenchyma was throughout congested and œdematous.

The pericardium contained a little serous fluid. The heart was small, with but little fat upon its surface. The blood was loosely coagulated; the valves were slightly thickened; the muscular tissue was of a remarkably dark brown color, but of normal consistence. The apex of the heart was opposed to the space between the fourth and fifth ribs.

The abdominal cavity contained a large amount (5 or 6 pounds) of yellow serum, from which some fibrine separated, on exposure to the air. The spleen was 5½ inches long, 3 inches broad, and 1 inch thick. Its capsule was wrinkled, and its parenchyma dark-brown.

The liver projected about 7 inches beyond the base of the ensiform cartilage, and filled up the entire epigastrium and both hypochondria. The right lobe measured 9¼ inches transversely, 9¾ inches from before backwards, and 5 inches in thickness. The left lobe measured 5 inches transversely, and 7¾ inches from before backwards. Disseminated throughout the organ, were large masses of cancer, which varied in size from a pea to a hen's egg, and some of which had an umbilicated depression on their outer surface, while in their interior they contained portions which were yellowish and in a state of fatty degeneration. Neither the trunk of the vena cava nor the portal vein were injured to any great extent, and the branches of both vessels were unobstructed. There were no enlarged glands in the fissure of the liver; the cystic duct was pervious; the hepatic tissue intervening between the nodules was for the most part very congested, but in other respects normal.

The mucous membrane of the stomach was throughout somewhat hyperæmic. In the pyloric half of the lesser curvature, the mucous membrane and submucous tissue were infiltrated with cancerous matter, over a space measuring 2 inches in length, 1 inch in breadth, and 2 lines in thickness. The pylorus itself was quite unaffected, and there was no infiltration of cancer in the adjoining lymphatic glands.

The intestines were collapsed; their mucous membrane was pale; their contents consisted of some gray mucus, slightly tinged with bile; the large intestine contained grayish-yellow pultaceous masses of fæces.

The pancreas, mesenteric, and retro-peritoneal glands were free from disease.

The kidneys were congested, but their structure was normal. The urine presented distinctly the reaction of bile-pigment; the prostate was normal, and the urinary bladder pale.

The femoral veins were free from coagula. Both lower extremities were uniformly œdematous.

Observation No. XIV.

Disordered Gastric Digestion.—Constipation.—Ascites.—Prominences appreciable through the Abdominal Parietes.—Increase of the Ascites. Dyspnœa.—Death.

Autopsy:—Numerous Deposits of Hæmorrhagic Cancer in the Liver, on the under Surface of the Diaphragm, in the Mesentery, and on the Peritoneum.—A Cancerous Mass, the size of a child's head, in the Cœliac Glands, situated in the Lesser Curvature, communicating by an ulcer with the interior of the Stomach.—Cancerous Nodules in the Right Ovary.

Johanna Dressler, widow of a shoemaker, aged 45, came under treatment on the 11th of November. She had always enjoyed good health, with the exception of an attack of inflammation in the chest, and several attacks of intermittent fever. Menstruation commenced so early as in the patient's twelfth year, and continued normal until two years before her admission, when the discharge became more scanty and less frequent, and at last ceased entirely. The patient had been delivered of four children, and eleven years before she had an abortion. She stated, that up to three weeks before admission she had felt well, but since then she had suffered from pains in the loins and umbilical region, and from chills alternating with heat. She complained of loss of appetite, confined bowels and rigid motions; and, fourteen days before admission, she noticed a swelling in the abdomen.

The abdomen was much distended, yielded a dull sound on percussion as high as the umbilical region, and fluctuated. The edge of the liver could be felt at the margin of the ribs in the right hypochondrium, thickened and covered with painful nodules; on palpation to the left of the middle line, a large round tumor could be discovered, which was tender upon pressure, and extended downwards to the level of the umbilicus. The spleen was not enlarged. On examination *per vaginam*, the pelvic cavity was found to be free from swelling; there was a pedunculated polypus attached to the cervix uteri. Tongue coated gray; appetite slight; nausea; severe lumbar pains; no motion of bowels for three days. Pulse 70, and small. Infusion of Rhubarb with Cherry-Laurel-water and a Clyster were prescribed.

This treatment brought away a few pale stools, which contained but little bile. The tenderness of the epigastrium and the pains in the lumbar region remained unchanged, although the distention of the abdomen diminished somewhat. In the umbilical region firm tumors could be felt, the size of a hen's egg, which were easily moved, and afterwards returned to their former place. These tumors were supposed to have their seat in the great omentum. Warm Cataplasms, Wine, and other Analeptics were prescribed.

The patient became rapidly collapsed; on the 18th of November the pulse was 80, small, and scarcely perceptible; extremities cool; abdomen very tense; great dyspnœa and restlessness.

Death occurred on November 19th.

Autopsy.

The membranes and substance of the brain were pale. The consistence of the brain was normal.

The thyroid gland contained a few ossified cysts.

The lungs were very œdematous.

The size of the heart was normal; its valvular apparatus was healthy; muscular tissue pale; blood firmly coagulated.

Spleen normal.

Rounded nodules, varying in size from a pea to a walnut, were disseminated throughout the liver. These nodules projected from the surface of the gland, and were here covered by the capsule, which was suffused with blood. In addition to numerous blood-vessels densely aggregated together, their cut surface displayed rounded extravasations, the size of a lentil, which were separated from one another by thin septa, and were distributed with tolerable regularity. Many of the smaller nodules from this cause resembled blackberries, whilst in others the extravasations were arranged in a radiated manner, leaving a light space in the centre permeated by blood-vessels. The septa which separated the extravasations were apparently formed by the meshes of the cancerous framework. The volume of the liver was slightly enlarged; the glandular tissue was congested, but in other respects normal.

Numerous nodules, of a similar character, were found on the under surface of the diaphragm, in the mesentery, and on the parietal peritoneum. A tumor, the size of a child's head, was connected with the lesser curvature of the stomach, the pancreas, and transverse colon. In the interior of this tumor was a cavity, the size of a man's fist, filled with dark fluid blood. In the lesser curvature of the stomach there was an elongated oval ulcer, through which there was a direct communication with the interior of the tumor. The mucous membrane of the stomach was in other respects free from disease.

The mucous membrane and contents of the intestines were normal.

The kidneys were small and pale.

There was a small cancerous nodule on the serous covering of the right ovary.

The uterus and urinary bladder were normal.

The abdominal cavity contained a large quantity of dark-colored serum.

OBSERVATION No. XV.

Symptoms of Indigestion.—Constipation, alternating with Diarrhœa.—Hæmatemesis and Bloody Stools.—Œdema of the Feet.—Large, painful, nodulated Tumor in the Left Hypochondrium and in the Epigastrium.—Enlargement of the Epigastric Veins.—Death under symptoms of Cerebral Paralysis.

Autopsy:—Numerous Cancerous Nodules in the Liver.—Compression of the Vena Cava in the Fissure of the Liver.—Scirrhus of the Lesser Curvature of the Stomach, at some places infiltrated with colloid matter.—Cancer of the Retro-peritoneal Glands.

Carl Andritschke, laborer, aged 61, an habitual drinker, was under treatment from the 12th of June to the 1st of July, 1858. Six months before, he began to complain of symptoms of indigestion, and suffered alternately from constipation and diarrhœa, the stools in the latter case being sometimes mixed with blood. Eight weeks before, the symptoms became rapidly worse; the abdomen was distended; the feet were œdematous, and the patient gradually lost strength.

On admission, he presented a pale anæmic appearance; his only complaints were loss of appetite and dyspnœa. The lower extremities were œdematous as high as the knees; there was no ascites, but the abdomen was distended from tympanites. The liver was considerably enlarged, and was tender upon pressure, especially in the epigastrium. The margin of the right lobe of the liver was not appreciable on palpation, but a nodulated formation was felt in the epigastrium, which moved downwards upon inspiration, the left extremity of which extended into the left hypochondrium, and the lower margin of which formed a straight line with the margin of dulness of the right lobe. No tumefaction of the spleen could be discovered, and there was no enlargement of the subcutaneous veins of the abdomen. The stools were brown and contained a large quantity of bile. The urine was free from albumen, and continued so until death. The sounds of the heart were normal; pulse 82. Nothing abnormal could be discovered in the lungs, excepting the physical signs of emphysema. Tincture of Rhubarb along with Bitter Almond Water and Spirit of Nitric Ether was prescribed.

On the 20th: great apathy; œdema of the feet increasing; brown pultaceous stools.

On the 23d: for some days has had epistaxis; appetite improved.

On the 25th: during the night, had great feeling of anxiety and suffocation, and a sensation of internal heat, together with palpitations and slight epistaxis. Pulse 96.

On the 26th: during the whole night had hiccup, with vomiting of recent and also dark brown blood; stools dark brown and mixed with clots of blood. There were distinct indications of ascites. From the epigastric veins, large branches were seen to pass up towards the axillary cavity. Instructions were given to make cold applications to the abdomen; while Ice and Acetate of Lead with Opium were prescribed internally.

On the 27th, there was continuous vomiting of blood. The hiccup had decreased under the administration of opium. The abdomen was very tympanitic. The false ribs in the left hypochondrium appeared pressed out. The tumor in the epigastrium was as movable as before. No stool since yesterday; great apathy; pulse 78.

On the 28th, no vomiting, but the hiccup had returned. The patient complained of pains in the left heel, in which nothing abnormal could be discovered.

On the 29th, there was again some vomiting of blood. The patient could not lay on the left side, on account of pains in the left hypochondrium. Bowels confined for two days. Slept little; intellect unimpaired. Pulse 88, very small and scarcely perceptible. Analeptics were prescribed.

On the 30th, no return of the vomiting of blood; slept somewhat better; subjective symptoms as before; tendency to drowsiness.

On the 1st of July, death took place under symptoms of cerebral paralysis. Jaundice had not showed itself.

Autopsy, 18 *hours after death.*

The lower extremities were swollen and œdematous. The skull-cap was normal. The longitudinal sinus contained a little firmly-coagulated blood. The dura mater was thickened and opaque. There were two drachms of clear fluid at the base of the cranium. The cerebral substance was very glistening and somewhat œdematous.

The pharynx and œsophagus were pale. The lining membrane of the larynx was slightly red; that of the trachea and bronchi extremely so. The thyroid gland was enlarged from the presence of colloid deposits.

The left lung was connected to the walls of the chest by old adhesions. The right pleural cavity contained several pounds of serous fluid. At the apex of the left lung were several patches, of a slaty-gray hue and destitute of air; posteriorly and inferiorly, this lung was œdematous. Slaty-gray induration was likewise observed in the upper part of the right lung; the lower lobe contained no air, and was compressed.

The ventricles of the heart contained firmly-coagulated blood. The valves and muscular tissue were normal.

The liver completely filled up the epigastrium. The suspensory ligament was dragged beyond the middle line to the left. The right lobe measured transversely 6¾ inches, from before backwards 7½ inches, and in thickness 6 inches. The left lobe measured 4 inches transversely, and 6¼ inches from before backwards. Nodules, varying in size from a pea to a walnut, were found upon its surface. The margins were obtusely rounded. The gall-bladder projected about half-an-inch beyond the margin. Similar nodules were found upon the under concave surface.

The spleen was small and pale, and its capsule was wrinkled.

The stomach was adherent to the left lobe of the liver. Close to the pylorus, nodules could be seen through the serous membrane, which at some places had a colloid appearance. The cut surface of these nodules was grayish-white and glistening. The walls of the stomach were for the most part much thickened, the thickness in the lesser curvature amounting to an inch, while at this part the infiltration with colloid matter was particularly marked. The degeneration of the walls at other parts was simple scirrhus. The disease did not extend beyond the pylorus.

The mesentery was normal. The small intestine and cæcum were pale. The mucous membrane at the ileo-colic valve was somewhat softened. The solitary glands in the ileum were enlarged.

The kidneys were small and pale; a small cyst was observed in the left kidney.

The bladder contained some yellowish-red urine, depositing a large quantity of lithates.

Some of the retro-peritoneal glands were in a state of cancerous degeneration.

The crural veins presented nothing abnormal. The vena cava was much constricted in its passage through the liver; some nodules projected into its interior, without, however, perforating the coats of the vessel at any place; no thrombi were found even here. The lining membrane of the vein was smooth throughout.

Observation No. XVI.

Long-continued Pains in the region of the Stomach, and Vomiting.—Symptoms of Peritonitis from Perforation.—Death.

Autopsy:—Purulent effusion into the Abdominal Cavity.—Perforating Cancerous Ulcer of the Stomach.—Cancerous Nodules in the Liver.

Louise Dremmler, unmarried, aged 42, was admitted into the Hospital on the 12th of November, 1859, and died the same day.

The patient came into the Hospital with all the symptoms of peritonitis from perforation. Notwithstanding this, she walked to the institution, but was not able to go upstairs. She stated that she had suffered for a long time from gastrodynia, and had been much troubled with vomiting, and that two days before she had been seized with severe pains in the abdomen.

The pulse was small and thready; the skin was cool and pale, like that of a corpse; the respiration was slow; great muscular prostration; intellect clear. Severe pain in the epigastrium; bowels not moved for some days; abdomen greatly distended and tense; the feet moderately œdematous.

Two hours after admission, the patient died.

Autopsy.

The cranium and its contents normal; brain anæmic.

Colloid matter in the thyroid gland. Air-passages pale. Margins of the lungs emphysematous; posteriorly, the lungs were œdematous.

Heart normal. Large coagulum of blood in the right cavities.

On opening the abdomen, gas escaped. The peritoneum contained a dirty-gray, purulent, fœtid fluid. The small intestines were agglutinated together. On bending back the left lobe of the liver, a perforating ulcer, the size of a groschen (6¼ Eng. lines), was observed in the anterior wall of the stomach, close to the cardia; the surrounding wall of the stomach was infiltrated with cancerous matter. At the margin of the liver, close to the gall-bladder, and likewise higher up, several cancerous nodules were found, varying in size from a pigeon's-egg to a hen's-egg. The size of the gland was somewhat enlarged; the hepatic tissue was fatty.

The spleen was small, collapsed, and pale.

The intestines contained fæces of normal character; their mucous membrane was pale.

The kidneys were of normal size and pale.

The urinary bladder was pale. The uterus and ovaries were atrophied.

OBSERVATION No. XVII.

Pains in the Hypochondrium.—Loss of Appetite and Strength.—Diarrhœa.—Visible Nodules in the Right Hypochondrium and Epigastrium, moving downwards on inspiration.—Œdema of the Feet.—Effusion into the Pleuræ and Peritoneum.—Death from Exhaustion.

Autopsy:—Fungating Excrescence on the Wall of the Stomach.—Cancer of the Liver.—Cancerous Nodules in the Hilus of the Spleen, encroaching upon the Gland.—Cancer of the Omentum and Peritoneum.

Johann Schikorra, day-laborer, aged 63, was admitted on the 2d, and died on the 13th of February, 1856. He dated the commencement of his complaint from the previous November. His first symptoms were pains in the left hypochondrium, loss of appetite and strength. The patient, however, continued at his work until fourteen days before admission, when he was attacked by diarrhœa and vomiting of a mucous substance, not mixed with blood.

On examination, the patient was found to present a very anæmic appearance. Lungs and heart normal. Prominent tumors were observed in the right hypochondrium and in the epigastrium, which moved downwards with each inspiration, to the extent of from one to two centimètres,[1] and again ascended during expiration. On palpation, these tumors were found to consist of hard, rounded, somewhat flattened, painful nodules, upon the surface of the liver. On percussion, the stomach appeared to be small. The dulness in the left hypochondrium was considerably increased; appetite slight. The stools were watery, and contained but little bile. Compound Tincture of Cinchona was prescribed, and an Opiate at night.

The diarrhœa ceased, but the patient declined very rapidly. The feet became œdematous, and serous effusions collected in the abdominal cavity and in the pleuræ. The consciousness became impaired, and death took place on the morning of the 15th

Autopsy, 8 *hours after death.*

Cerebral membranes moderately congested. Œdema of the pia mater. Brain-substance anæmic, glistening, and œdematous.

Thyroid gland small and pale. Bronchial glands melanotic. Air-passages pale. Larynx ossified.

The lungs were non-adherent, dry, and emphysematous; posteriorly and inferiorly, they were compressed by the fluid contained in the pleuræ, which amounted on either side to about two pounds.

The pericardium contained two ounces of fluid. Heart small. The blood in the right side exhibited a buffy coat on its surface. Valves and muscular tissue normal.

The abdominal cavity contained about four pounds of watery fluid, with a few fibrinous flakes. Smooth, isolated nodules of cancer were scattered over the peritoneum.

The spleen was connected anteriorly and inferiorly to the ribs by a hard, dense, cancerous tumor, which was opposed to the concave surface of the organ over half of its extent; at one place the tumor passed into the parenchyma of the spleen, but everywhere else it could be separated from the capsule, which was intact. The spleen was anæmic, wrinkled, and of normal consistence. The tumor presented the characters of fibrous cancer.

Extensive, loose, cock's-comb-like, livid excrescences, up to an inch in diameter, were growing from the fundus of the stomach. These growths presented, on section, a white medullary appearance. The coats of the stomach, between these excrescences, were likewise infiltrated with cancerous matter, and were here and there ulcerated. Nearer to the pylorus, three similar excrescences were found, attached by pedicles of normal mucous membrane. The mucous membrane, moreover, was of a grayish-livid hue. The pylorus and cardia were free from disease.

The omentum was drawn up towards the transverse colon, and contained several deposits of medullary cancer, from the size of a hazel-nut to a walnut. The lymphatic glands in the fissure of the liver likewise contained cancerous matter.

The liver extended three inches below the ensiform cartilage, and one inch and a-half below the margin of the ribs. It contained, in the first place, the nodules, which had been felt and seen through the abdominal walls during life; and, in addition to them, a large number of cancerous deposits, varying in size from a pea to a walnut, and presenting a cup-shaped surface, were distributed over the upper and under surfaces of both lobes. The portal vein and bile-ducts were free from disease. The hepatic cells were pale, and some of them contained accumulations of brownish-green pigment granules. In the portions of the hepatic tissue, which were comparatively normal in appearance, the cells contained scarcely a trace of oil, but the cells in the congested dark tissue, which surrounded the nodules, were filled with oil globules.

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[1] One centimètre = ·3937 English inch.—TRANSL.

The blood from the right side of the heart yielded 3·78 per cent. of an ethereal extract, abounding in cholesterine. No leucine could be found in the alcoholic extract.

On injecting red material into the hepatic artery, and yellow into the portal vein, it was found that the red matter penetrated everywhere distinctly into the cancerous mass, but the yellow matter nowhere.

The intestines were pale, and the fæces thin and pultaceous. The mucous membrane of the intestines was pale; the mesenteric glands were normal.

The kidneys were anæmic and of normal size and consistence.

The urinary bladder was moderately filled with clear urine. The prostate was normal.

III.—CANCER OF GLISSON'S CAPSULE.

OBSERVATION No. XVIII.

Repeated Attacks of Pains in the upper part of the Abdomen and in the Lumbar Region.—Derangement of the Functions of the Stomach.—Obstinate Constipation.—Jaundice.—Smooth Swelling of the Liver.—Bile-Pigment and Albumen in the Urine.—Œdema of the Feet.—Emaciation.—Loss of Strength.—Delirium.—Somnolence.—Death.

Autopsy:—Hard Cancer in the Hepato-duodenal Ligament, which accompanied Glisson's Capsule as far as the ultimate ramifications of the vessels and Bile-ducts, in the interior of the Liver.—Obliteration of the Ductus Choledochus.—Cancerous Nodules in the Wall of the Portal Vein and in the Serous Membrane of the Liver, Duodenum, and Pelvis.—Scirrhous Thickening of the Pancreatic Duct.—Remains of a local Peritonitis in the Pelvis.—Inflammatory Infiltration of both Kidneys.

N. N., a female, aged 53, who had lived in comfortable circumstances, had suffered occasionally during the last three years from violent colicky pains in the upper part of the abdomen. In the middle of October, 1858, the patient had an attack of these pains, which were concentrated in the right hypochondrium and lumbar region. At the same time the appetite failed, the bowels became confined, and the patient lost flesh.

On the 20th of November, jaundice supervened, and on the 22d, she was admitted into the Hospital.

The woman was intensely jaundiced, prostrate, and emaciated, and complained of constant dull, but sometimes sharp, pains in the right hypochondrium. The liver was very large, extending from the fifth rib to three inches below the margin of the ribs in the right mammary line;

its surface was smooth and tender on pressure. The spleen was moderately large; the tongue dry and brown; no appetite; stools gray and clay-like; the urine was dark-brown, and acid, and contained bile-pigment and albumen; its specific gravity was 1018. Pulse 60, and small. Electuary of Senna, warm Cataplasms, and a nutritious non-irritating diet were prescribed.

During the progress of the disease the hepatic dulness increased in extent; the pains in the lumbar region became more severe; the urine contained a larger quantity of albumen, and likewise casts of the uriniferous tubes, while it diminished in amount. Vichy Water was prescribed as a drink, and Rhubarb was ordered, to keep up the action of the bowels.

At the beginning of December, œdema of the feet and ascites showed themselves; the emaciation and prostration increased rapidly. On the 16th of December, the consciousness began to be impaired, delirium supervened, and alternated with somnolence, until, on the 19th, death occurred, under symptoms of cerebral paralysis.

Autopsy, 36 *hours after death.*

The body was emaciated and jaundiced. The brain and its membranes were anæmic.

There was a small quantity of yellow fluid in the pleuræ, and a considerable amount in the abdominal cavity. There was nothing abnormal in the air-passages or lungs.

The liver presented a smooth surface; only a few nodules, about the size of hazel-nuts, projected from the convex surface of the right lobe. The organ measured 11½ inches in breadth; the height of the right lobe amounted to 8¼ inches, that of the left lobe to 6½ inches; the greatest thickness was 4¼ inches. The hepato-duodenal, and hepato-gastric ligaments were considerably thickened by the deposit of firm, white cancerous tissue. The lymphatic glands in the fissure of the liver contained cancerous matter. The bile-ducts and blood-vessels of the liver were imbedded in the cancerous mass. The walls of the hepatic and cystic ducts were from the first so blended with the new growth that no trace of their membranous canals could be discovered, and they appeared simply as narrow tubes, permeating the cancerous tissue. The ductus choledochus could not be traced to the opening in the duodenum, and appeared to lose itself in the new growth. The portal vein was angularly compressed; and at some places nodules of cancer of a rounded, lobulated form projected into the interior of the vessel. The hepatic artery did not appear essentially altered.

The branches of the portal vein and bile-ducts, in their subsequent progress through the substance of the liver, were everywhere surrounded by a similar, firm scirrhous tissue, which extended as far as the acini, and imparted to them a peculiar speckled appearance. The bile-ducts at some places presented cystic dilatations, which were filled with amber-yellow, viscid bile. No alteration could be discovered in the walls of the branches of the hepatic veins. Here and there in the investing membrane of the gland, white nodules as large as a pea were observed; similar nodules were likewise seen on the outer surface of the stomach. The cancerous mass which adhered to the duodenum and pancreas did not penetrate into the glandular tissue of the latter again, but the wall of the pancreatic duct was thickened and enveloped in cancerous matter. Several nodules, the size of beans, were observed in the serous coat of the duodenum. The mucous membrane, however, of this portion, as well as of the entire gastro-intestinal tract, was unaltered.

Several cancerous nodules, the size of beans, were found in the cavity of the pelvis, but more particularly in the Plica Douglasii.[1] The peritoneum was here thickened, and adhesions existed between the uterus, ovaries, and rectum. The broad ligaments were shortened and shrivelled. These appearances indicated an old pelvic peritonitis.

Both kidneys were enlarged; their cortical substance was hypertrophied, and of a grayish-yellow color. Their consistence was flabby and soft.

For the above observation I am indebted to Hr. Lebert.

OBSERVATION No. XIX.

Disordered Digestion.—Vomiting of Coagulated Blood, and afterwards of Brown Fluid.—Constipation.—Jaundice.—Distention and Dulness of the Epigastrium and Right Hypochondrium.—No perceptible Tumor.—Death by Syncope.

Autopsy:—Very extensive Ulcer, with Smooth Base aud Terraced Walls in the Pyloric Portion of the Stomach.—Its Base and Circumference in a state of Cancerous Degeneration.—Extension of the Cancer to the Fissure of the Liver, and, along with Glisson's Capsule, into the Interior of the Gland.—Compression of the Hepatic Duct; Cancerous Degeneration of its Walls.—Enlargement of the Bile Ducts.—Compression of the Portal Vein.—Dilatation of the Veins of the Small Intestines.—No Tumefaction of the Spleen.

Carl Leber, a journeyman-miller, aged 38, was under treatment from the 22d to the 28th February, 1856. Six months before, he began to complain of pains in the region of the stomach, which were particularly apt to be increased after eating, but were unaccompanied by vomiting, until five weeks before admission. At this time, according to the patient's account, he vomited a large quantity of coagulated blood, and almost every day since then he had vomited a brownish material. Together with these symptoms, there was great emaciation and constipation; and, fourteen days before admission, jaundice had made its appearance, and had gradually increased.

On examination of the chest, the pulmonary sounds were found to extend rather far down, but were in other respects normal. The heart's sounds were likewise normal.

The epigastrium was tense, especially towards the right side, and there it was also tender. The abdomen exhibited a prominent bulging, corresponding to the outline of the stomach; and the whole distended part was dull on percussion. It was only on the left side, at the margin of the ribs, and above this, that the sound on percussion was clear and tympanitic.

No definite tumor was anywhere perceptible. The size of the spleen and liver appeared to be normal. The jaundice was intense; the urine was very bilious; the bowels were confined, and the fæces were of a grayish-yellow color. The patient vomited a dirty greenish-brown fluid, several times every day, usually in large quantity. Immediately after the vomiting the swelling seemed to diminish.

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[1] The plica semilunaris Douglasii is the semilunar fold of peritoneum, forming the base of the excavation between the uterus and rectum. It is best seen when the uterus is pushed forwards and the rectum backwards.—TRANSL.

The consciousness was not at all impaired; great prostration; frequent faintings upon rising up; appetite completely absent. Wine, beef-tea, yolk of egg, ice, and tannin were prescribed.

The prostration continued to increase; the extremities became cool; pulse 80, and small.

On the evening of the 28th, the patient died from exhaustion.

Autopsy, 17 *hours after death.*

The skin presented an intensely jaundiced hue. The skull-cap and dura mater were yellowish. The blood in the sinuses was coagulated. The brain and its membranes were normal.

The thyroid gland was enlarged, with small cysts, containing colloid matter, scattered through it. The bronchial glands were melanotic. The mucous membrane of the larynx, trachea, and bronchi was slightly injected.

The lungs were much distended. Over the right lung were a few ligamentous adhesions. The pulmonary tissue throughout was dry, except posteriorly and inferiorly, where there was moderate hypostatic congestion.

The pericardium contained several drachms of yellow serum. The right cavities of the heart were filled with firmly coagulated blood, and the left cavities with a loose coagulum. The valves and muscular tissue were normal.

The stomach was remarkably distended; it filled the left hypochondrium and extended to three inches above the symphysis pubis. The pylorus was deeply concealed beneath the liver, and firmly adherent to the under surface of the left lobe. The mucous membrane of the fundus of the stomach presented a dirty-yellow color, and was thickly beset with livid spots,—the remains of old hæmorrhagic suffusions. Before reaching the pylorus, an ulcer was observed, including three-fourths of the circumference of the stomach, the terraced margins of which sharply divided the mucous membrane, which was everywhere firmly adherent. The hard, tolerably smooth base of the ulcer presented numerous recent and old hæmorrhagic stains, and when scraped with a knife yielded a milky juice containing the elements of cancer. Not only at the part corresponding to the ulcer, but also to a considerable extent around it, all the coats of the stomach, external to the mucous membrane, were infiltrated with hard cancerous matter to the thickness of half-an-inch; the muscular coat was much hypertrophied. The cancer penetrated at one place into the interior of the left lobe of the liver, but only to an extent corresponding to the size of a cherry. It connected the pancreas to the wall of the stomach, without passing into the substance of the gland. A firm, nodulated cancerous tumor extended from the stomach along the hepato-gastric and hepato-duodenal ligaments to the fissure of the liver, and from this it penetrated, with Glisson's capsule, deep into the substance of the liver. In the fissure of the liver, the hepatic duct was not merely compressed, but the walls of the duct, before its subdivision, were infiltrated with cancerous matter. Passing upwards, the first branches met with were dilated and rigid; the entire liver was of a deep jaundiced hue; its consistence was unaltered; its surface was smooth, and its margins sharp. The gall-bladder was contracted and filled with gray mucus; the cystic duct was obliterated, but not degenerated from cancer. The portal vein was somewhat constricted by the tumor above described; the roots of the mesenteric veins in the small intestine were dilated. The mucous membrane of the small intestine presented an appearance of active hyperæmia; its contents were of a dirty yellowish-gray color.

Pancreas firm. The pancreatic duct contained some clear juice. The mesenteric glands were small.

Spleen of normal size, pale, firm, and tenacious.

Kidneys firm, of a uniform grayish-yellow hue, surfaces smooth.

The bladder contained a little urine; its mucous membrane was yellowish. The prostate was somewhat enlarged.

The blood in the vena cava inferior, and in the hepatic veins, yielded 0.919 per cent. of an æthereal extract abounding in cholesterine; by treatment with alcohol, leucine was discovered in it. The blood from the right and left cavities of the heart yielded 0.472 per cent. of æthereal extract (for the most part, cholesterine), and likewise contained some leucine.

IV.—CANCER OF THE LIVER CONSEQUENT UPON CANCER OF THE RECTUM.

OBSERVATION NO. XX.

Annular Infiltration of the Rectum with Ichorous discharge.—Slight enlargement of the Inguinal Glands.—Pains in the course of the Ischiatic Nerve.—No obvious indications of disease of the Liver.—Marasmus.—Death.

Autopsy:—Cancer of the Rectum, of the Left Lobe of the Liver, and of the Lumbar, Hypogastric, and Inguinal Glands.—Cancerous Nodules in the Muscular Tissue of the Heart.

Gottfried Heiber, aged 67, was under treatment in the Clinique, at Breslau, from the 26th November to the 25th December, 1856.

According to his own account, the patient had always enjoyed good health, until ten weeks before admission. His bowels had been moved daily, and he had never experienced any pain on going to stool. His present complaint commenced gradually with discharge of mucus, sometimes mixed with small quantities of blood, and accompanied by frequent tenesmus.

On examining the rectum, a fissured annular swelling could be felt, which was tender upon pressure, and imparted an extremely fetid odor to the finger. The patient had no pain during micturition, but complained of pains in both lower extremities, especially the left, along the course of the ischiatic nerve. The inguinal glands were slightly enlarged, but almost free from pain, and easily movable; there was no œdema of the feet. No nodules could be felt on the surface of the liver, which was not at all tender. There was a large scrotal hernia, which had existed for twenty years.

Appetite moderate; no fever; cachectic color of the countenance and remarkable emaciation. Belladonna clysters were found to be intolerable and to increase the tenesmus. Infusion of Rhubarb was prescribed.

On December 8th, a copious discharge of ichorous fluid took place from the rectum. No symptoms of indigestion. Extract of Cinchona and Rhubarb with Belladonna were prescribed.

December 15th: the emaciation has made rapid progress. The patient complains sometimes of violent pains in the calf of the right leg; appetite moderate; riband-shaped fæces.

On December 23d, it was necessary to remove the patient to a separate ward, on account of the fetor being so offensive to the other patients. On the 25th, death occurred from exhaustion.

Autopsy.

Nothing abnormal was noticed in the cranium or in its contents.

The pericardium contained several drachms of serum. There was a white nodule, the size of a pea, in the wall of the right auricle, immediately beneath the pericardium. The muscular walls of the right side of the heart were very thin; the valves were normal. The dimensions of the left ventricle were normal; the valves were slightly opaque; the aorta was very atheromatous.

The spleen was shrivelled; its parenchyma was bright-brown and tenacious.

The lymphatic glands along the vertebral column were infiltrated with cancerous matter, and varied in size from a hazel-nut to a pigeon's-egg; these enlarged glands extended downwards into the pelvis, and upwards into the fissure of the liver.

The liver was of normal size. Numerous large cancerous nodules were disseminated through the left lobe, and small nodules were likewise found in the right lobe. The bile was fluid and dark-brown.

The stomach was contracted; its mucous membrane presented a livid hue; in the centre of its posterior wall was an old cicatrix, around which there was a slight puckering, but nowhere any cancer.

The mucous membrane of the small intestine was pale. The large intestine was somewhat enlarged and contained hard fæces.

About half-an-inch above the sphincter ani, there was a hollow space filled with a stinking, ichorous fluid. The anterior wall of the large intestine was five lines thick, and infiltrated with dense cancerous matter, which extended as far as the prostate; the posterior wall presented a deep, irregular, cancerous ulcer.

The kidneys and urinary bladder were normal.

V. CANCER OF THE LIVER CONSEQUENT UPON CANCER OF THE OVARIES.

OBSERVATION NO. XXI.

Dyspeptic symptoms.—Jaundice.—Emaciation.—Two large tumors above the brim of the pelvis.—Liver large and nodulated, with Tight-lace fissures.—Tenderness of the Abdomen.—Death from Exhaustion.

Autopsy:—Cysto-carcinoma of both Ovaries.—Cancer of the Liver.—Lymphatic vessels of the Liver filled with Cancer-cells.—Cancerous Lymphatic Glands in the fissure of the Liver.—Compression of the Portal Vein.—Enlarged Hepatic Artery.—Cancer of the Cœliac and Lumbar Glands.—Cancerous Nodules in the mucous membrane of the Urinary Bladder.—Hydro-nephrosis of the Right Kidney, and Cancerous Infiltration of the Left.

Amalie Stein, aged 48, wife of a journeyman-joiner, was under treatment from the 8th to the 12th of June, 1854.

Five years before, the patient had suffered from an attack of jaundice, which disappeared after several weeks, but since that period she had not enjoyed good health, and had complained especially of pains in the abdomen. Two years before admission the menstruation had ceased, but previous to that had been regular. The patient had been delivered of eight children, the younger of whom was twelve years old.

Six months before admission the digestion became impaired; the patient suffered from pains in the epigastrium, more especially after eating sour articles of diet; the bowels were confined. Eight weeks before admission jaundice was superadded to the above symptoms, and was accompanied by a remarkable loss of strength.

The patient on admission was extremely emaciated; her skin was of a citron-yellow color, and of waxy translucency, and was very itchy: pulse 70, and small. Nothing abnormal could be discovered in the thoracic organs.

The abdomen was much enlarged, especially the right side. Nodulated tumors could be even seen through the abdominal parietes; these tumors lay upon both iliac bones, and extended downwards into the cavity of the pelvis. They were movable, and about the size of a child's head, the right being somewhat larger than the left; the hand could be made to penetrate deep in between them. Above these pelvic tumors the anterior margin of the liver could be felt, covered with rounded nodules, which, like those upon the upper surface, were tender upon pressure. An elongated depression was discovered on palpation below the margin of the right rib. (Tight-lace fissure.)

Nothing abnormal could be discovered in the stomach. The bowels were confined, and the stools contained no bile. The urine was intensely brown, but free from albumen and sugar.

Notwithstanding the employment of morphia and cataplasms, the abdominal pains increased, until death occurred on the 12th of June. The patient retained her consciousness up to the time of death.

Autopsy, 8 *hours after death.*

The skull-cap was thin and anæmic. The dura mater was thickened and intensely yellow. The longitudinal sinus contained a small quantity of loosely coagulated blood; the pia mater was slightly injected; some yellowish serum was found in the occipital fossæ. A small thin extravasation of blood lay upon the convex surface of the right hemisphere. The brain-substance was normal, as regards its consistence and vascularity.

The right pleura contained four pounds, the left pleura two pounds, and the pericardium about half-an-ounce, of yellowish serum. The mucous membrane of the pharynx and œsophagus was colored yellow, and had its veins enlarged. The thoracic aorta was of normal size, but slightly atheromatous.

The mucous membrane of the larynx was pale, and that of the trachea slightly injected and covered with gray mucus. The thyroid gland was anæmic, and the bronchial glands melanotic. The right lung was infiltrated with yellow serum; the lower lobe was crepitant, anæmic, and splenified at its margins. The bronchi were somewhat enlarged, and their secretion, at some places, was intensely jaundiced. The left lung was œdematous at its apex, and inferiorly presented hypostatic congestion.

The pericardium was yellow, and, at some places, opaque. The heart was small, and moderately fatty. The right cavities contained a firm coagulum of blood, and the left cavity a loose coagulum. All the valves were normal.

About five pounds of serum were found in the abdominal cavity. The peritoneum was at some places injected and opaque, and here and there was covered by isolated flakes of lymph.

The liver extended as high as the fourth rib, and the lower margin of the lungs descended to the level of the sixth rib. The right lobe of the liver was 9 inches long and 4 inches thick, and at its middle was marked by a transverse groove, along which the serous membrane was thickened and opaque. The entire upper surface of the organ was rough and uneven, and covered by numerous nodules, varying in size from a pea to a pigeon's-egg.

On the upper surface of the liver was observed a network of lymphatic vessels, which looked as if they were injected with yellow wax, and which extended from the cancerous nodules to the suspensory ligament. When some of the cords were isolated, a yellowish-white sausage-formed mass could be squeezed out of them, which consisted of completely developed cancer-cells, nuclei, and cell-contents.[1]

Numerous nodules were likewise found at the margins and on the under surface of the liver. These nodules were everywhere depressed and cup-shaped, hard, yellow, and of a fibrous character on section. The lymphatic glands in the fissure of the liver were infiltrated with cancerous matter, and a plug of black, inspissated bile was impacted in the cystic duct. The hepatic artery was enlarged. The portal vein was angularly compressed; its walls were normal. The gall-bladder contained tar-like bile.

The parenchyma of the liver, between the cancerous nodules, was seen to consist of yellow lobules, surrounded by red margins. At many places saccular dilatations of the bile-ducts were observed, with smooth, slightly colored walls, and filled with a clear, tenacious, viscid, almost colorless fluid.

The spleen was of normal size and congested.

The mucous membrane of the stomach was at some parts ecchymosed and covered with gray mucus. The pancreas was dense and firm, and the adjoining lymphatic glands were infiltrated with cancer. Numerous minute nodules, up to the size of a lentil, were observed in the mesentery. The mesenteric veins were not enlarged. There was no deposit in the mesenteric glands, and only a little in the retro-peritoneal glands.

The lower part of the abdomen, as well as the cavity of the pelvis, was filled up by two tumors. That on the right side, which was the larger of the two, was almost the size of a man's head. These tumors consisted of several rounded cysts, some of which were filled with a gelatinous fluid, and others with cancerous matter. At those parts where the cancer was deposited the serous covering presented numerous ramifications of blood-vessels, and the surface at many places was marked by umbilicated depressions. The Fallopian tubes, on both sides, coursed along the anterior surfaces of the tumors, and terminated in normally-formed, somewhat injected fimbriæ, which adhered to the tumor.

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[1] This observation is opposed to the views of many authors, according to whom the reabsorption of bile is made to take place chiefly by the lymphatic vessels and not by the veins. Here there was intense jaundice, although the lymphatic vessels were blocked up by cancerous matter.

A few small deposits of cancer were found in the peritoneal covering of the uterus, and on the posterior lip of the vaginal portion. The uterine tissue at other parts was rather firm, and the mucous membrane normal.

In the urinary bladder, near the opening of the urethra, were three flat, button-shaped, round, hard, intensely yellow cancerous deposits, the size of a sechser (or about the size of a threepenny piece). The right ureter and the pelvis of the right kidney were very much dilated, and the right kidney was atrophied. The left kidney was flabby; its capsule was detached with ease, and its parenchyma contained a wedge-shaped, gray, medullary deposit.

The intestinal canal presented nothing abnormal.

VI. Cancer of the Liver consequent upon Cancer of the Brain.

Observation No. XXII.

Alleged Injury of head.—Apathy.—Loss of Memory.—Headache.—Slow Pulse.—Ptosis and Hemiplegia on the Left Side.—Involuntary Evacuations.—Death under Symptoms of Cerebral Paralysis.

Autopsy:—Cancerous Cyst, the size of an apple, in the anterior portion of the right hemisphere of the Brain.—Cancerous Deposit, the size of an orange, infiltrated with extravasated blood in the Right Lobe of the Liver.

Johanna Gernt, aged 38, the wife of a mason, was under treatment in the Clinique at Breslau, from the 17th to the 22d of June, 1856.

The patient stated, that, with the exception of temporary headaches, she had always enjoyed good health, up to her present illness. On the 18th of May, according to her husband's statement, a piece of tile had fallen on the right side of her forehead; her relatives supposed that her husband had struck her at this part. She became immediately oblivious and very obtuse; she often did the reverse of what she intended to do; she vomited frequently, and complained of violent headaches. Since the 3d of June she had been in another department of the Hospital, and there, in addition to the complaints of headache, the symptoms noted were great apathy, slow pulse, normal temperature, and confined bowels. She was, however, able to walk, and to speak rationally. On the 14th, ptosis of the left upper eyelid had been observed.

On June 17th, pulse 60; respirations 20. The movements of the left side of the face, and the left half of the body, were impaired. The tongue deviated towards the left; the left upper eyelid drooped. There was apathy, somnolence, and involuntary evacuations, but no vomiting: the patient's only complaint was of severe pain in the frontal region. Abdomen soft and painless; dimensions of the liver and spleen normal.

Temporary relief from the headache was obtained by derivation from the bowels, and leeches to the temples.

On the 22d, the pulse rose to 130; the temperature became elevated; the patient was quite unconscious, and loud râles were audible over both lungs. Death occurred at 7 in the evening.

Autopsy, 16 *hours after death.*

Nothing abnormal was observed on the scalp, with the exception of a small, superficial cicatrix, of old date, over the occipital protuberance. The cranial bones were normal throughout, and presented no trace of any injury.

The dura mater was distended and tense. The longitudinal sinus contained loosely coagulated blood. The inner surface of the dura mater was slightly adherent to the cerebral arachnoid. The pia mater was much congested. There was no serum at the base of the cranium.

A portion of the right anterior frontal lobe, measuring 1¼ inch in diameter, was observed to present partly a yellowish, and partly a reddish-brown color, while the convolutions were here quite flattened out and unrecognizable. On cutting into this part two ounces of a reddish-yellow, serous fluid escaped, which coagulated on exposure to the air, and contained no elementary structures, with the exception of blood corpuscles. A single cavity was found, the size of a small apple, the walls of which appeared ragged and grayish-red. Externally there was a thin layer of coagulated blood, and the adjoining peripheral gray matter was in a state of yellow softening. In addition to this, the wall of the cavity at every part was formed by a soft, gray, very vascular layer of cancerous matter, measuring from four to five lines in thickness, which, on examination, was found to consist of a delicate fibrous stroma, filled with large cells of very various forms. The remaining portion of the brain-substance was congested, and of firm consistence, but perfectly normal.

The thyroid gland was pale. The bronchial glands were small. The lungs were congested, and somewhat œdematous posteriorly, but were in other respects sound. The heart was fatty; the blood was loosely coagulated; the valves and aorta were normal.

The œsophagus, stomach, intestinal canal, pancreas, and mesenteric glands, presented no alteration of any importance. The spleen was small and anæmic, with a few patches of ecchymosis in the pulp.

The form of the liver was normal, and its upper surface smooth. In the convex part of the right lobe there was a soft, gray, vascular, medullary cancer, the size of an orange, which was perfectly round, and was sharply defined from the surrounding hepatic tissue. In its microscopic characters it closely resembled the tumor in the brain. Numerous brown and black extravasations of blood were disseminated through the cancerous tumor in the liver. The rest of the hepatic tissue presented nothing abnormal, with the exception of slight fatty degeneration. The bile was of a deep brown color, and of thick consistence.

The kidneys and bladder were normal. The right ureter was somewhat enlarged from being compressed by the uterus, which was displaced to the right, and drawn towards the right ovary. The uterus itself was normal. The ovaries were large, and contained a number of corpora lutea.

VII. CANCER OF THE LIVER, CONSEQUENT UPON CANCER OF THE SKIN OF THE HEEL.

OBSERVATION No. XXIII.

Primary Cancer of the Left Heel, removed by the Galvanic Cautery.—Return of the Disease after the lapse of a year.—General Cachexia.—Death.

Autopsy:—Extensive Cancerous Tumor of the Heel, springing from the Periosteum of the Calcaneum.—Secondary deposits in the course of the lymphatics of the Leg and Thigh, in the Pia Mater, and in the Lungs.—Cystic Cancer of the Liver.

Christian Krüger, aged 74, a post conductor, came under treatment on the 1st of December, 1857, and died on the 21st of May, 1858.

In the year 1856 the patient had a cancer removed from the left heel by means of the galvanic cautery, and left the Hospital with the wound healed. According to his own statement the tumor returned at the end of a year, in consequence of the friction of his boot. The patient's prostrate condition, and the existence of secondary enlargements in the glands of the groin, counterindicated a repetition of the operation. The treatment was restricted to dressing the heel with chlorine-water and attention to diet.

Among the symptoms were loss of appetite, but never vomiting; the bowels were always confined. The patient never complained of pains in the abdomen. The liver was enlarged, but its surface was smooth and only slightly tender upon pressure. The urine was normal, and there was no jaundiced tint of the skin. For a long time the patient had a cough, with mucous, but never bloody or purulent expectoration. Ultimately, the emaciation and prostration increased rapidly; the patient lay for the most part in a state of apathy, and, during the last twenty-four hours of life, was quite unconscious. Neither paralysis nor spasms were at any time observed.

Autopsy.

A tumor, the size of a fist, with a rugged surface, was found on the heel of the left foot. On section, it presented a medullary, reddish-gray appearance. At one circumscribed place the tumor was firmly adherent to the periosteum, which was easily separable from the subjacent, softened bone. The rest of the tarsal bones were sound.

On the leg a cord was felt, like a string of pearls, which could be traced to above the bend of the knee. On the inner side of the thigh were some small and large tumors, some of which, when cut across, displayed a gray medullary mass, while others presented cavities filled with a bloody fluid. The femoral artery and vein were free from disease, as far as their ramifications. The cancerous nodules, moreover, were found to correspond, not with the course of the vein, but with that of the lymphatics, and to lie beneath the skin, and not among the muscles. There were no coagula in the veins in the neighborhood of these nodules, and there was no œdema of the foot. The right lower extremity did not present any of the morbid appearances seen in the left.

The lympnatic glands along the vertebral column and the mesenteric glands were not affected. There were a few exostoses on the bodies of the last dorsal and of the lumbar vertebræ.

The dura mater was firmly adherent to the skull-cap, and thickened. There was a large quantity of serum beneath the arachnoid and in the ventricles. The ventricle of the septum lucidum was distended with serum, so as to form a bladder. There were a few cysts on the choroid plexus. At two places in the pia mater tumors were observed, of a dirty-gray color, similar to those in the left leg, and varying in size from a pea to a bean.

The lymphatic glands in the neck were not enlarged.

Grayish-white nodules, from the size of a hemp-seed to that of a hazel-nut, were disseminated through the lungs. Some of these nodules were situated immediately beneath the pleura; at other places there was a mass of grayish-white infiltration, an inch and a-half in diameter.

The pericardium and heart were normal.

The spleen was small, pale, and atrophied.

The liver was somewhat enlarged, more especially in thickness. On its upper surface were observed an immense number of large and small tumors, which could be seen through the serous covering, and which felt like fluctuating abscesses. On cutting into the liver, round nodules were found, from half-an-inch to two and a-half inches in diameter, which were bounded externally by a capsule of connective tissue They presented a radiated structure, and enclosed round serous cysts from 3 to 11 lines diameter, and filled with a bloody fluid. Some of the cysts were situated at the margin of the cancerous nodules. The hepatic parenchyma presented its normal reddish-brown appearance. Both lobes were implicated in the disease to the same extent. The gall-bladder was contracted, and, together with grayish-yellow mucus, contained a firm white mass, which was formed by a cancerous tumor growing into its interior.

The stomach, intestinal canal, and kidneys were normal.

VIII.—EMPHYSEMA OF THE LIVER.

Emphysema Hepatis.

As an appendix to the morbid growths of the liver, we may consider a peculiar alteration of the organ, which has been designated Emphysema hepatis.

Cases are met with where the liver contains gas in such quantity that it floats in water, and yields a clear sound on percussion. The air may gain access to the liver in various ways.

In most cases it is an abscess, or an hydatid sac, which, after having discharged its contents into the stomach or intestinal canal, becomes filled with the gases of the gastro-intestinal canal, owing to the pressure exerted by the abdominal walls, and by the muscular tissue of the bowel. Graves (*Dublin Journal*, January, 1839), Haspel (*Maladies de l'Algérie*, T. I., p. 200), and other writers, have recorded observations of this nature. Haspel had the opportunity of tracing the process in a recently-killed bullock, in which an abscess, communicating by a small opening with the colon, became filled with air and the contents of the bowel, and spaces containing air (*Vacuolen*) were likewise found in the surrounding parenchyma.

But even in the normal condition of the liver, air from the intestinal canal may enter the bile-ducts, when, in consequence of some morbid state, the pressure upon the intestinal gases is unusually increased. Thus, I found the gall-bladder distended to the size of an ostrich-egg in the body of a man 44 years of age, who had died under symptoms of ileus, in consequence of a fall from a horse. In this case there was retention of the fæces, accompanied by enormous tympanitic distention of the abdominal walls, in consequence of paralysis of some of the coils of intestine, which were contused and covered with bloody exudation. As the result of this condition, the gases were forced from the intestine through the ductus choledochus into the gall-bladder, which, when cut into, collapsed with a hissing noise, and was found to contain no bile. There were no signs of decomposition in the body.

It is more difficult to account for those cases in which cavities filled with air, from the size of a millet-seed to that of a pea provided with smooth walls, and discharging a bloody fluid when squeezed, are found scattered through the hepatic parenchyma. I have met with this condition in the body of a female, aged 32, who died from purulent inflammation of the joints, death being preceded a short time by abortion, and by the appearance of petechiæ. Similar observations have been made by other authors;—by Stokes (*Diseases of the Chest*, p. 369), in an individual who died from the rupture of an aortic aneurism into the œsophagus; by Louis (*Sur la Phthisie*, 2^me^ Ed., p. 150), in a tubercular patient; by Cambay (*La Dyssenterie*, p. 533), after severe dysentery and peritonitis; and by Piorry (*Gaz. des Hôpitaux*, 1851, No. 24), in a case of small-pox. In all the cases, with the exception of that recorded by Louis,[1] no signs of decomposition could be discovered.

The cause of this peculiar development of gas in the liver is obscure, and the nature of the gas is unknown. We are not, in my opinion, warranted in assuming with Piorry, that the intestinal gas reaches the liver through the eroded roots of the portal vein. It is more probable that the affection ought to be regarded as a local process of disintegration, and that it originates under certain circumstances, in those complicated metamorphoses of matter which occur in the liver, from the presence of large quantities of the carbo-hydrogens. Whether emphysema of the liver may, as Louis and Piorry believe that they have proved, exist during life, and be diagnosed from the disappearance of the hepatic dulness, can only be satisfactorily determined by further observations.

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[1] Louis, from the small size of the liver in his case, concluded that the gas had been developed in it long before death. (Louis on "Phthisis," *Syd. Soc. Transl.*, p. 127.)

CHAPTER II.

DISEASES OF THE BLOOD-VESSELS OF THE LIVER.—

THE HEPATIC ARTERY, THE PORTAL VEIN, AND THE HEPATIC VEINS.

Historical Account.

ALTHOUGH since the publication of George Ernst Stahl's work, *De Vena Portæ Porta Malorum*, the vascular system of the liver has occupied an important place in Pathology, through the doctrine of portal vein-diseases, and has furnished the key for numerous disorders of the system, but few anatomical facts were collected which could serve as the foundation for the opinions concerning abdominal-plethora, infarctions, engorgements (*Anschoppungen*) of the gland, hæmorrhoids, &c., entertained by Stahl, Boerhaave, Van Swieten, Kämpf, &c. The doctrine remained to all intents and purposes purely theoretical, and was the more injurious to the progress of knowledge, because the authority of its originators was great and lasting.

As proofs of the enlargement of the portal vein, Stahl could only adduce the observation of Vesalius concerning the dilatation of the hæmorrhoidal veins in cases of induration of the liver, and those of Wedel, Stange, and Hiller concerning enlargement and rupture of the vasa brevia of the stomach in cases of hæmatemesis (*loc. cit.*, p. 28 and 29). Before the time of Stahl, Meibomius (*Dissert. de Sanguinis Educt.* Helmst. 1674, § 40) had maintained that the branches of the portal vein are sometimes enlarged to double or treble the normal size; similar statements are likewise to be found in the works of Mercatus and Martin (*De Affect. Hypochondr.*). On the whole, the facts remained inconsiderable, in proportion to the importance of the theory constructed from them, and were limited to isolated notices, among which may be mentioned the observations of rupture of the vasa portæ made by Vesalius, Schenckius, Testa and Meli, cases of the ossification of this vessel recorded by Ruysch, Lobstein, Otto, and others, examples of its obliteration, &c.

No real progress was made in this field of inquiry, until the time when physiology began to elucidate the obscure views entertained concerning the diseases of the portal vein, and when the untenable nature of the doctrine of infarctions and black bile could no longer remain concealed.

By degrees the conditions were determined, upon which the derangements of this portion of the vascular system depend. It could not fail to be perceived that the laws which govern the general circulation likewise hold good here, although this had been denied. In place of an obscure hypothetical force, the influence exerted by the disordered action of the heart and lungs, and by the numerous structural diseases of the liver itself, upon this portion of the circulation, was duly recognized. The important influence exerted by the muscular action of the abdominal walls, and by the muscles, vessels, and nerves of the intestines, in propelling the portal blood, began to be more carefully investigated. (See Vol. I., the Chapters on Atrophy of the Liver and Fatty Liver; and likewise Vol. II., the Chapters on Pigment-Liver, Hyperæmia of the Liver, Cirrhosis and Induration, Waxy Liver, &c.)

In like manner, the consequences of plethora of the portal vein began to be better understood, while the numerous pathological conditions, which the earlier physicians included under this designation, were greatly circumscribed. It was perceived that catarrhal affections of the stomach and intestines, with the numerous consequent derangements of digestion, secretion, and innervation, supervened as the first effects of this plethora, and that they were followed by dropsical effusions into the peritoneal cavity, and lastly, by hæmorrhages from the stomach and intestines; whilst, in addition to these results, the absorption of the products of digestion by the roots of the portal vein was diminished, in consequence of the increased pressure exerted by the blood in these vessels.

In this way a well-founded opinion concerning abdominal plethora was gradually developed, and much of what had been referred to it by the ancients, was removed from its domain. It would seem, however, that the modern tendency to attribute all morbid processes to an anatomical origin, has in this respect been sometimes carried too far. The changes in the composition of the portal blood, upon which Stahl, and more particularly Boerhaave and Van Swieten, placed such great stress, but which were afterwards allowed to fall into oblivion, have again in our own day been ascertained to be sources of morbid conditions which must not be disregarded. The entrance into the portal vein of colorless corpuscles, of pigment scales, and of various products of metamorphosis, in certain diseases of the spleen (see the Pigment-Liver, Vol. II., p. 1), the effects upon the liver of different matters which find their way into the portal blood during digestion (see Beau, *Archiv. Gén. de Méd.*, Avril, 1851, and Vol. II. of this work, p. 43), together with many other circumstances affecting the circulation, innervation, and secretion in the portal system, are subjects which afford an ample field for investigation in connection with this question.

The researches of J. Hunter, Sasse, and others, upon phlebitis, at the commencement of the present century, furnished the essential material for constructing the anatomical theory of diseases of the portal vein. It soon came to be recognized that the portal vein, like other veins, was subject to inflammatory conditions, which led at one time to suppuration, and at another time to obliteration, thickening, and calcification of the venous wall. Observations of inflammation of the portal and hepatic veins—pylephlebitis, and phlebitis hepatica,—with their various modes of termination, were accumulated in a comparatively short period. These observations suffered to some extent from the same ambiguities that attached to the doctrine of phlebitis in general. It is only recently that coagulations of blood in the interior of the veins, independent of any inflammation of the venous wall, began to be distinguished from those coagula which are the result of inflammation, and that, speaking generally, the different relations of the two forms of coagulation have been clearly understood.

In addition to thrombi, and the conditions which proceed from them, the portal vein has been found affected with cancer, the development of which has been carefully traced.

Abundant material has been gradually accumulating in the literature of medicine, for elucidating the symptomatology and diagnosis of all these morbid conditions. The most important works upon the subject are the following:—

I. *On Obstruction of the Portal Vein and Adhesive Pylephlebitis.*

Farre, Morbid Anatomy of the Liver. London, 1810.
Bouillaud, Archiv. Gén. de Méd., T. II., pp. 198 and 199.
Honoré, Archiv. Gén. de Méd., T. III., p. 153.
Gendrin, Traité de Méd. Prat., T. I., p. 233.
Reynaud. Journ. Hebdomad., 1829, p. 170.
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Stannius, Krankheit. Verschliess. Grösserer. Venestämme.
Puchelt, Das Venensystem, 1844, Bd. II.
Carswell, Pathological Anatomy, article Atrophy.
Andral, Clinique Méd., T. II., p. 315.
Rokitansky, Pathol. Anat., III., s. 331.
Devay, Gaz. Médic., 1843, p. 17.
Craigie, Pathol. Anat., p. 127.
Pressat, Bullet. de la Société Anat., 1836, p. 60.
Stokes, Lectures on the Treatment of Internal Diseases. Translated from English into German by Behrend. Leipzig, 1839.
Schuh, Zeitschr. der Gesellsch. Wiener Aerzte, 1846, II., s. 353.
Raikem, Mémoir. de l'Académ. Royale de Méd. de Belgique, Tom. II., p. 38.
Frisson, Gaz. des Hôp., 1848, p. 420.
Monneret, Union Médicale, 1849, p. 49.
Dowel, The Dublin Quarterly Journal, 1851.
Barth, Bulletins de la Société Anat., 1831, p. 354.
Handfield Jones, Med. Times and Gazette, 1855, p. 184.
Duchek, Prager Vierteljahrschrift, XII.
Gintrac, Observations et Recherches sur l'Oblitération de la Veine Porte. Bordeaux, 1856.
Virchow, Verhandl. der Physic-Medic. Gesellsch. in Wurzburg, VII. s. 21.
Ziegler, De Venæ Portæ Obstructione. Dissert. Inaugural. Regiomont., 1860.

II. *On Dilatation of the Portal Vein.*

Stahl-Gaetke, De Vena-portæ. Halæ, 1698.
Portal, Maladies du Foie. 1813, p. 37.
Linas, Bullet. de l'Acad. Impér. de Méd., 1855, Oct.

III. *On Calcification of the Portal Vein.*

Ruysch, Observationes Anatom. LXX.
Otto, Path. Anat., s. 358.
Biermeyer, Mus. Anat. Path. Vindob. 102.
Rokitansky, *op. cit.*, I., s. 656.
Phœbus, De Concrementis Venarum Osseis et Calculosis. Berol., 1832.
Puchelt, *op. cit.*, II. s. 272.
Bourdon et Piedagnel, Encyclop. des Sciences Méd., T. V., 86.
Pressat, **Raikem**, **Dowel**, **Gintrac**, **Virchow**, **Bamberger**. *Op. cit.*

IV. *On Rupture of the Portal Vein.*

Andreas Vesalius, Epist. de Radice Chynæ. Opera Omnia. Lugd. Batav., 1725, Vol. II., p. 674.
Schenckius, Observ. Med. rar. Doubtful case.

Testa, Delle Malattie del Cuore.
Meli, Sulle Febbri biliose. 1822.
Lobstein, Traité d'Anat. Path., Tom. II., § 1127.
Toulmouche, Archiv. de Méd. 3me Série, III., 1837, p. 228.

v. *On Purulent Inflammation of the Portal Vein.*

Sasse, Diss. de Valor Sanguiferor. Inflamm. Halæ, 1777.
Bichat, Anat. Génér., T. I., p. 70.
Dance and Arnott, On Phlebitis. German Ed., by G. Himly, Hannover, 1830.
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Schönlein, Klinische Volesungen von Güterbock. Berlin, 1842.
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Gluge, Atlas der Pathol. Anatom.
Budd, Diseases of the Liver, 3d Edit. 1857, p. 176.
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Hillairet, Union Médic., 1849, p. 262.
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Breithaupt, Preuss. Vereinszeit, 47, 1851.
Leudet, Archiv. Gén de Méd., Févr., 1853.
Buhl, Zeitschr. f. ration. Med., N. Folge. IV. 3, 1854.
Langwaagen, De Venæ Portarum Inflammatione. Diss. Inaug. Lips. 1855.
Lebert, Anat. Pathol. II.
Bristowe, Transactions of the Pathological Society of London. Vol. IX., p. 279.

I.—DISEASES OF THE HEPATIC ARTERY.

The trunk and branches of the hepatic artery are more liable to morbid conditions than has hitherto been believed. They participate in most of the processes of degeneration to which the gland is liable; more rarely the vessel is itself diseased, independently of any morbid state of the gland.

In every case where masses of new connective tissue are formed in the liver, as the capillaries of the portal vein are destroyed, new vessels are developed, which are branches of the hepatic artery, and may be injected from this vessel. In both simple and granular induration of the liver, the bands of connective tissue contain a rich arterial network, the adjoining branches, and frequently also the trunk of the artery are enlarged. (See Vol. I., p. 23).

A similar arrangement holds good in the case of cancerous deposits, where I have found the branches, and in several cases also the trunk of the artery, dilated; it is also observed in old obliterations of the portal vein, &c. This condition is accounted for by the altered nutrition of the hepatic tissue, as well as by the vicariously-increased flow of blood in the hepatic artery, resulting from closure of the other system of vessels, the capillaries of which communicate freely with those of the hepatic artery.

It is remarkable how frequently we find black pigment in the branches of the hepatic artery, which hitherto has been entirely overlooked. In cases of cirrhosis and of morbid growths in the liver, I have repeatedly found individual branches of the artery completely filled with black matter, while other branches were only partially blocked up.[1]

This condition points to derangements of the circulation, which may frequently occur in the arterial ramifications, as a result of the contractility of the connective tissue of the indurated hepatic parenchyma, and of other causes.

Obstruction of the hepatic artery by the impaction of a clot, by embolism, has not as yet been observed. The direction in which the cœliac and hepatic arteries pass off from the aorta, are not favorable to any such impaction.

Obstruction, and likewise aneurismal formations of the hepatic artery, are rare lesions; atheroma of the vascular coats, from which these conditions usually originate, is only an exceptional occurrence in this portion of the arterial system.[2] Gendrin (*Traité de Méd. Pratique*, Tom. I., p. 183) has recorded the case of a female, 23 years of age, in whose body an old obliteration of the hepatic artery was found.

Ledieu (*Journ. de Bord.*, Mars. 1856, and *Schmidt's Jahresb.* Bd. XCIII., s. 56) mentions a second case where occlusion of the hepatic artery was produced by an aneurism. The patient was a female, aged 54, who had suffered from chronic bronchitis, with emphysema and albuminuria; her digestion was disordered; there were no symptoms of hepatic disease; she died of general dropsy. At the autopsy the liver was found to be of the usual size, and somewhat cirrhotic; the portal vein was normal. Of the branches of the cœliac axis, the coronary artery of the stomach and the splenic artery were unaltered; but in the hepatic artery, somewhat above the place where it gave off the pyloric artery, which remained pervious, there was a very hard tumor, the size of a hazel-nut. This tumor completely closed up the channel of the vessel; a probe could not be passed through it, either from the one side or from the other. The tumor consisted of an aneurism which was filled with a very firm coagulum. The gall-bladder was filled with bile of normal character. From this observation Ledieu drew the conclusion, that the liver may be nourished, and that its secreting functions may be kept up by the portal vein alone. It is obvious, however, that the anastomoses of the pyloric artery might have supplied the liver sufficiently with arterial blood.

Aneurisms of the hepatic artery have been described by Stokes, Sestier, Wallmann, and Lebert. In three of the instances recorded by these writers the aneurism opened into the abdominal cavity; in one case it opened into the gall-bladder, and a fifth case proved fatal by exhaustion.

Sestier (*Bulletins de la Société Anatomique*, Tom. VIII., p. 33) found an aneurism, the size of a hazel-nut, filled with a plug of colored blood-coagulum, on the right branch of the hepatic artery, near the point of subdivision; the gall-bladder was at several places in a state of gangrene. The patient had complained during life of the symptoms of a chronic painful affection of the stomach, and died from exhaustion.

Stokes (*Diseases of the Heart*, pp. 617 and 638) records two cases. In one, which was observed by Beatty, the liver was apparently enlarged in consequence of its displacement by the aneurism, and returned to its normal situation after the rupture of the sac; the disease had existed for a year and a-half. In the second patient the gland was displaced in a similar manner; the aneurism was situated at that portion of the artery which is covered by Glisson's capsule, and from the pressure exerted by it had given rise to dilatation of the bile-ducts and persistent jaundice. Death resulted from rupture of the sac into the abdominal cavity; the liver was reduced in size.

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[1] See also the "Pigment-Liver," Vol. II., p. 3.

[2] There was only one instance of aneurism of the hepatic artery, out of 551 cases of aneurism collected by Crisp. Among the cases collected by Lobstein, Bizot, and Rokitansky, it occupied a similar position in the scale of frequency.

The observations recorded by Wallmann and Lebert are much more detailed:—

Wallmann's patient (*Archiv f. Pathol. Anatomie*, Bd. XIX. s. 389) was a female, 36 years of age, who for three months had suffered from attacks of violent pain in the upper part of the abdomen, coming on after intervals of several days, and who had gradually lost strength and become emaciated. The spleen was found to be enlarged; the liver projected three finger-breadths beyond the margin of the ribs, and was hard; there was no ascites and no fever. Several times in the course of the day the patient was attacked with paroxysms of pain, during which she behaved like a mad person. The hepatic region at these times became very tender upon pressure, after which the attacks ceased; the bowels were confined, and the stools were firm and brown. The stools gradually assumed a grayish-white appearance; the gall-bladder projected, in the form of a smooth, globular tumor, and the liver became enlarged. Ten days before death intense jaundice was developed, and the probable presence of gall-stones was diagnosed. The pains at last became continuous; fever set in; the abdomen became distended without any obvious effusion; sudden collapse and death closed the scene. The liver was found to be considerably enlarged, extending as high as the fourth intercostal space, and at the same time it was soft and friable. The gall-bladder was distended and filled with inspissated dark bile; the cystic duct was impervious. The upper half of the hepatic duct was greatly distended, and, about two inches from its junction with the cystic duct, its walls were thickened, and it was closed up by a tenacious fibrinous mass. Lying in an oblique direction between the stomach and the liver was a tumor almost the size of a child's head, which on the right side extended as high as the gall-bladder, and on the left as high as the upper margin of the stomach; it thus filled up a great portion of the lesser omentum; inferiorly, it reached as far as the transverse colon. This tumor had an egg-shaped form, and at its lower extremity, near the colon, was a rupture 1¼ inch in length, from which a dark plug of blood projected. The sac was filled with blood and coagulated fibrin deposited in concentric layers, the weight of which amounted to a pound and a-quarter; its wall was from two to three lines thick, and its inner surface was covered with bridge-like bars and ragged excrescences. Coursing along the posterior wall of the sac was a band-like process, covering the hepatic artery, the anterior surface of which presented an elongated fissure, one centimètre long and four millimètres broad, with smooth, rounded margins. This fissure was seven millimètres[1] distant from the subdivision of the hepatic artery, and communicated with the sac which lay upon the artery. The ductus hepaticus and the ductus choledochus were in part included in the anterior wall of the sac. The portal vein was adherent to its posterior wall. The spleen was large and hard. The stomach and intestines were not essentially altered.

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[1] One millimètre is equal to ·03937 Eng. inch.—TRANSL.

Lebert's Observation (*Anatomie Pathologique*, Tom. II., p. 322), is as follows:—

A female, aged 30, had menstruated regularly since her fourteenth year: three years before, she had an attack of typhoid fever, and four months before, she passed through an attack of acute articular rheumatism, which was followed by no injurious consequences. Since the beginning of May she had complained of frequent pains and feeling of tightness in the region of the stomach, without any known cause, especially after meals. On the morning of the 28th of May, during an aggravation of the pains, the patient was suddenly seized with vomiting of bright-red, almost pure blood, which recurred five times in succession; on each occasion she brought up nearly half-a-quart of blood. On the following morning the vomiting returned three times, and was followed by bloody stools, which recurred two or three times daily, up to the 7th of June, the day of the patient's admission into Hospital. The patient had frequent attacks of cramp and fainting, resulting from the loss of blood.

On admission she presented a very pale and anæmic appearance, with a slight jaundiced tint of the conjunctivæ. Pulse 116 and very small; an anæmic bruit was audible over the heart and in the vessels of the neck; lungs normal. Nothing abnormal could be discovered on examination of the liver; the great tenderness of the epigastrium and pyloric region rendered it very difficult to practise palpation. The tongue was covered with a whitish coat; there was no appetite. The day before admission the patient had passed two fluid bloody stools. Whenever she raised herself up, she complained of noises in the ears, and objects appeared to float before her eyes; if she continued in the erect posture she lost her consciousness, and had slight convulsions in her upper extremities; these attacks lasted for five minutes, and immediately that the patient was laid on her bed her consciousness returned. Ergot and Ice internally were prescribed. During the following day the stools became firmer, but were still always colored with blood. The attacks of cramp returned two or three times every day. The patient suffered from violent pains in the stomach; and the urine contained a small quantity of bile-pigment.

On June 12th there was no longer blood in the stools; there was an abatement of the pains in the stomach; the patient had one attack of vomiting, the ejected matters containing no blood.

On June 14th the symptoms were delirium, restlessness, palpitations, and vertigo. Pulse 120; temperature of skin elevated; abdomen distended and tympanitic. Stomach very tender; there were again four bloody stools.

There was slight improvement after taking Sulphuric Acid Lemonade, but the bloody, dark reddish-brown stools continued to return. The pains in the stomach and palpitations remained unaltered; the appetite was slight; the jaundice disappeared almost completely.

On June 26th the patient had a fresh attack of convulsions, followed by somnolence. There was vomiting and diarrhœa, without any blood in the ejected matters.

On June 28th the cardiac impulse was found, upon examination, to be increased, and a prolonged systolic bruit was audible over the base of the heart; pulse 120. The patient had two or three attacks of vomiting in the day, without any blood, and three fluid stools, which again contained blood; food was retained with difficulty, and the patient could only take milk and beef-tea. The stools continued bloody, notwithstanding the employment of every variety of astringent and hæmostatic remedy. The vomiting returned every four-and-twenty hours, although not always regularly at the same time, and the vomited matters presented only a faint reddish color. The exhaustion continued to increase, and on July 6th, at 4 in the morning, the patient died.

Autopsy, 36 *hours after death.*

The brain and its membranes were anæmic, and contained but little serum.

The lungs at their anterior margins were emphysematous, and contained very little blood.

The heart was of normal size; the margin of the mitral valve was somewhat thickened, and covered with soft vegetations; the muscular tissue was flabby.

The stomach was free from ulceration; the mucous membrane in the fundus was softened and much attenuated; in the neighborhood of the pylorus it was slightly thickened.

The liver was of the ordinary size; its tissue was reddish-brown and normal; the bile-ducts were throughout slightly enlarged, and filled with yellowish, inspissated bile. An aneurism, the size of a pigeon's egg, and filled with coagulated fibrin, deposited in concentric layers, was found lying transversely in front of the portal vein, in the course of the hepatic artery. The lining membrane of this aneurism was free from disease, but the lower third of the sac was adherent to the gall-bladder, and had thrown a large quantity of blood into its cavity. The gall-bladder still contained much fluid and coagulated blood; its mucous membrane was thickened and infiltrated with blood. The ulcer, by means of which the communication was established between the gall-bladder and the aneurism, was surrounded by small superficial erosions, and several other erosions were also found in the fundus of the gall-bladder. The cystic duct and the ductus choledochus contained friable coagula of blood. It was in this way that the blood had passed into the intestinal canal, and had in part regurgitated into the stomach.

The spleen and kidneys were normal.

The mucous membrane of the intestinal canal was normal, except in the dependent parts of the coils, where it was infiltrated with blood.

The symptoms, to which aneurism of the hepatic artery gives rise, are accordingly of a threefold nature. In the first place there is the tumor, which is sometimes remarkably large and displaces the liver; secondly, there is the neuralgic pain produced by pressure upon the hepatic plexus of nerves; and lastly, there is jaundice caused by compression of the bile-ducts. The fatal termination in most cases takes place under symptoms of internal hæmorrhage. It is very easy to mistake such a case for the colic arising from gall-stones.

II. DISEASES OF THE PORTAL VEIN.

A. COAGULA OF BLOOD IN THE PORTAL VEIN, AND INFLAMMATION OF THIS VESSEL.—THROMBOSIS VENÆ PORTÆ, AND PYLEPHLEBITIS, ADHÆSIVA CHRONICA.—OBSTRUCTION OF THE PORTAL VEIN.

1. *Causes and Anatomical Description.*

The coagula of blood which are met with in the portal vein have at different times received various explanations. Whilst the earlier Physicians believed that infarctions proceeded from a simple stagnation of blood, the coagulum was afterwards attributed, under the phlebitic theory, to a disease of the venous wall, and inflammation of the portal vein came to be regarded as the constant cause of the venous obstruction. Two varieties of this inflammation were distinguished according to its effects, the adhesive and the suppurative. Modern observations have determined that the majority of blood-coagula in the portal vein occur independently of any inflammation of the venous wall, that the wall of the vessel frequently becomes inflamed secondarily, and that inflammation of the vein constitutes the starting-point of the morbid process in a comparatively small number of cases.

In many cases, when the disease is far advanced, it is a difficult matter to explain the etiological relations of the altered contents and of the venous wall, or to determine which may be the primary and which the secondary lesion, and this is the more difficult when the anatomical description is deficient in the necessary details. Hence some of the cases recorded in medical literature are only of limited value.

In discussing this subject we shall commence with the simpler forms, and afterwards proceed to the more complicated.

Coagula of blood are developed in the portal vein as in other parts of the venous system:—

a. In consequence of weakened force of the circulation, from diminished action of the heart, or from marasmus. This is a rare occurrence in the portal vein, as compared with other veins.

I have observed two cases of this nature. The first, which has already been mentioned in Vol. I., p. 188, was that of a man, 44 years of age, who, after suffering for several months from great dyspnœa and palpitations, and repeatedly expectorating blood, became very anæmic, while œdema showed itself in his feet. On examination, the lungs were found to be free from tubercles; but on the left side, at the fifth costal cartilage, a loud systolic bruit was audible. A few days after admission the dyspnœa increased, and was attended by anxiety; and in this state the patient was seized with vomiting of a greenish fluid, while at the same time the abdomen became tender, the stools were fluid, reddish-brown, and bloody. At the autopsy the pulmonary artery was found to be inflamed, while the channel of the vessel was almost completely occluded by thrombi, which were partly old and firmly adherent to the thickened venous wall, and partly recent prolongations of the former. The trunk, as well as the roots and branches of the portal vein, was completely blocked up by reddish-black recent coagula, which could be easily detached from the healthy venous wall. The entire serous membrane of the small intestine and of the mesentery appeared thickly beset with small red ecchymoses. The stomach contained black flakes of blood, and its mucous membrane presented recent hæmorrhagic erosions. The mucous membrane of the small intestine was of a dirty-red color, tumid, and covered with bloody mucus. The large intestine was but slightly altered from its normal condition. The abdominal cavity contained a large quantity of brownish-red serous effusion. The liver was small, collapsed, and flabby; there was abundance of bile. The spleen was large; it contained much blood and some pigmentary deposit.

In this case the coagulation of blood in the portal vein took place several days before death, and its occurrence was indicated by the supervention of painful distention of the abdomen, hæmatemesis and bloody stools. The coagulation ensued, when the obstruction in the pulmonary artery had advanced so far, that the venous circulation was almost completely arrested. No local causes for the thrombosis could be discovered either in the portal vein, the walls of which were normal, or in the liver, which merely appeared collapsed in consequence of its supply of blood being cut off.

In the second case the coagulation had only occurred during the agony which preceded death; consequently the lesions resulting from the obstruction were of a trifling nature, and had not given rise to any symptoms during life. The patient was a man, 23 years of age, who was admitted into the Clinique at Breslau on June 30th, 1855, in a state of great exhaustion, and presenting all the symptoms of subacute pulmonary phthisis. Eight days before death œdema made its appearance in the left side of the face and in the left arm; it increased very rapidly, and likewise extended to the soft palate and the uvula. Death took place under symptoms of asphyxia. At the autopsy, advanced tubercular deposits were found in both lungs, together with tubercular ulceration of the large intestine; the right side of the heart was much distended by firm, buffy coagula, which extended far into the vessels; old globular vegetations were imbedded between the trabeculæ of the left ventricle. The left jugular and subclavian veins were filled with firm thrombi; the portal and hepatic veins contained reddish-black coagula, which likewise filled up the splenic and mesenteric veins. The liver was congested and somewhat enlarged; the gall-bladder was œdematous and distended with orange-yellow bile. The spleen was double its normal size, reddish-brown, and soft. The serous membrane of the small intestine appeared brightly injected; its mucous membrane, as well as that of the stomach, was tumid, and at some places covered with bloody mucus.

The following appears to be a much more frequent cause of thrombosis of the portal vein, than marasmus:—

b. The local disturbance of the circulation of blood, resulting from those diseases of the liver that induce destruction of numerous capillaries, or constriction of the branches of the portal vein.

The disease in this case is of long duration; various changes ensue in the thrombus itself, and likewise in the venous wall, while the consecutive derangements in the organs belonging to the portal system are so prominently developed as to enable us to diagnose the morbid process during life.

The simple and granular induration, cirrhosis of the liver, and likewise chronic atrophy, are the chief diseases which, in their advanced stages, lead to obstruction of the portal vein.[1]

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[1] See p. 22. It is often a difficult matter to determine how far the deranged capillary circulation, the constriction of individual vessels, or the extension of the chronic inflammation to the wall of the vessel, contributes towards the obstruction.

In this case the formation of the thrombus is rarely limited to individual ramifications of the vessels; it usually extends to the trunk and main branches. It may be incomplete, merely constricting the vessel (Gintrac); but usually it is complete, and obstructs the vessel completely.

The mass of the thrombus, as a rule, is firmly adherent to the lining membrane of the vessel; it is an exceptional occurrence for it to be found soft and friable; in most cases it is firm and hard, and torn with difficulty, while here and there it is organized into a cellulo-vascular tissue (Reynaud). Its color is grayish-red, brown, or blackish, or, as stated by Carswell, it may be jaundiced. Coagula are also observed, which are deposited in concentric layers, and which are externally decolorized, and internally blackish; recent coagula are likewise met with, which are attached as prolongations to those of an earlier date (Frisson). The vein itself is usually dilated (Carswell[1]); its wall exhibits traces of chronic inflammation, induced by the presence of the thrombus; it is thickened, and externally it is adherent to the surrounding tissues, while internally it is rough, uneven, and injected (Reynaud and Gintrac). Calcareous plates, in the form of delicate isolated scales, or of larger annular lamellæ, are tolerably frequently found imbedded in the venous wall.

These conditions will be further elucidated by the details of a few cases.

A man, aged 50, who had suffered from intermittent fever, and was pale and weak, became jaundiced, and was seized by copious vomiting of bile, diarrhœa, ascites, and dyspnœa. The superficial veins of the abdomen were very prominent, especially those on the right side. On opening the body after death, fibrinous exudation was found in both pleural cavities, while the peritoneum contained a turbid flaky effusion of a reddish-brown color. The coils of intestine were adherent to one another. The mesenteric glands were enlarged. The abdominal veins were enlarged and tortuous, and at some places were filled with firm coagula. The mucous membrane of the stomach and intestines was dark-red. The spleen was very large. The liver was small, hard, and covered with exudation. The gall-bladder contained 90 grammes (about 3⅙ oz. avoird.) of bile. The walls of the portal veins were completely ossified, forming a sort of sheath, filled with a firm, reddish mass, which extended a long way in the form of a semi-solid coagulum (*Frissôn*, *Gaz. des Hôpitaux*, 1848, p. 420).

Monneret (*Union Médicale*, 1849, p. 49) has recorded another case, which may likewise be quoted here.

A book-keeper, aged 42, who had undergone various severe diseases in warm climates, was seized with hæmatemesis, bloody diarrhœa, and ascites. The subcutaneous abdominal veins were varicose. The liver was found to be atrophied; its texture was firm and yellow, but not granular. The portal vein was enlarged and filled with a very firm, reddish, and, at some places, whitish, thrombus, which adhered firmly to the rough, thickened, and injected lining membrane of the vessel. The gall-bladder contained two gall-stones; its walls were of firm, cartilaginous consistence. The spleen was very large.

Dowel (*The Dublin Quarterly Journal of Medical Science*, Aug., 1851, p. 201) observed a patient of middle age, who suffered from ascites and anasarca, and ultimately was attacked by erysipelas of the lower extremities. There was granular atrophy of the liver. The trunk and branches of the portal vein, with the exception of the splenic vein, were plugged up with a soft mass, which appeared to consist of nothing else than altered fibrin. A similar substance was likewise found in the hepatic branches of the portal vein, and was firmly adherent to the lining membrane of the vessel.

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[1] Craigie (*Pathological Anatomy*, p. 127), in one instance, found the portal vein constricted as far as the splenic and mesenteric veins.

In a second case of a similar nature, the portal vein contained a firm coagulum, and its walls were thickened, white, and covered internally with bony plates.

Gintrac (*Observations et Recherches sur l' Oblitèration de la Veine Porte*, Bordeaux, 1856) records five similar cases, which came under his own notice, of which the following are three:—

J. Dudon, a female, aged 47, had suffered several times from intermittent fever, when in July, 1846, she was seized with persistent pains in the sides of the abdomen, accompanied by slight fever. The abdomen was distended and globular; its walls were thin and covered with enlarged veins. The feet were œdematous; the stools were thin; the urine was scanty and red; the appetite was moderate. Paracentesis was performed, by means of which a large quantity of yellowish, somewhat opaque, fluid was drawn off. The ascites returned rapidly, and a large ecchymosis made its appearance in the left inguinal region. The paracentesis was repeated, and was followed by death. The abdominal cavity contained a large quantity of yellow fluid; the peritoneum was smooth, and not inflamed. The mucous membrane of the stomach was normal; the intestinal vessels were, at some places, enlarged. The liver was small, granular, firm, and yellow; the gall-bladder was filled with bile; the portal vein was completely obstructed by a firm, solid, grayish-white coagulum. The spleen was of normal size; the kidneys were normal.

A. Fauguet, aged 45, a shepherd, who had been badly nourished, and had suffered from irregular attacks of intermittent fever, was seized with pains in the lumbar region, which were followed by œdema of the feet and ascites. The ascites suddenly disappeared, but soon returned, and was accompanied by enlargement of the abdominal veins; the appetite was slight; the body was emaciated; the urine was copious, and free from albumen. After Digitalis, Squill, and Scammony had been tried without any effect, paracentesis was had recourse to, but the ascites returned the day after the operation. The subsequent symptoms were profuse diarrhœa, pains in the abdomen, and dyspnœa, terminating in death. The abdominal cavity contained a large quantity of somewhat flaky serum; the peritoneum was injected; the liver was small, uneven, and cirrhotic; the biliary passages were normal. The portal vein at its bifurcation was filled with a brownish-yellow, pultaceous soft mass, which completely blocked up the vein, and was firmly adherent to the slightly reddened wall. The mucous membrane of the stomach was injected. All the remaining organs were normal.

P. Carriot, aged 66, suffered for three years from hæmorrhoids, and afterwards from retention of urine and pains in the loins. The latter symptoms were soon followed by œdema of the feet, and ascites. The patient had no appetite; the stools were normal; the urine was albuminous. Paracentesis was performed, after which it was ascertained that the spleen was enlarged. The paracentesis was repeated, and was followed by diarrhœa and vomiting, which persisted and induced death by exhaustion. The abdominal cavity contained a large quantity of yellow fluid. The spleen was large and firm. The liver was small, compact, and yellow; the gall-bladder was filled with greenish bile. The walls of the portal vein contained several calcareous plates, and the vessels before its bifurcation was partly blocked up by a brown, firm coagulum. A yellow membranous substance extended for a long distance over the lining membrane of the vein.

Besides cirrhosis, cancer of the liver gives rise to occlusion of the portal vein. In this case the process is for the most part limited to individual branches, which are compressed by the cancerous deposits, or which are destroyed in the interior of the morbid tissue; the thrombosis is rarely general. Under such circumstances the vein contains in some cases a simple blood-coagulum, with the products of its metamorphosis; but in other cases it contains cancerous matter. (See p. 46, and likewise Observation No. X., p. 75; No. XI., p. 79, and No. XVIII., p. 92).

It is only in exceptional cases that abscesses of the liver induce coagulation of blood in the portal vein; when such an event occurs, the thrombus in most cases undergoes purulent disintegration and metastatic deposits take place. (See Vol. II., page 127.)

Dilatations of the bile-ducts not unfrequently induce chronic inflammation and narrowing of the portal vein by pressure, as happened in a case recorded by Virchow (*Verhandlungen der Physik. Medicin. Gesellsch.* in Würzburg, Bd. VII., s. 21).

A day-laborer, aged 66, who had formerly suffered from hæmaturia and jaundice, was seized with a recurrence of the jaundice and diarrhœa. The general health was but little deranged; the urine was loaded with bile-pigment, and the stools were decolorized. The diarrhœa was speedily checked by means of tincture of opium; the urine became clearer, and the jaundice diminished, but soon returned. Notwithstanding that the digestive powers remained good, the cachexia rapidly increased, and the jaundice became so intense as to justify the appellation of "Melas Icterus;" this was followed by rapid loss of strength, somnolence, delirium, and death. The autopsy disclosed the following appearances:—the spleen was greatly enlarged and adherent to the diaphragm and abdominal walls; its arteries and veins were much thickened and enlarged. The liver was green, granular, and somewhat reduced in size. The gall-bladder was distended, and contained a number of gall-stones. The cystic duct was large and very tortuous; this was likewise the case with the ductus choledochus, the terminal portion of which, just before it opened into the small intestine, was dilated, and had impacted in it a round concretion the size of a musket-ball, which constituted the cause of the jaundice. The bile-ducts were enlarged; the hepatic parenchyma was soft and green; the acini were small. The branches of the portal vein in the interior of the liver were large and permeable. The inner wall of the trunk of the portal vein, as the vessel approached the liver, was thickened, so as to occasion an actual narrowing of the caliber of the vessel. Towards the right lobe of the liver the thickness of the inner membrane amounted to one centimètre (·3937 Eng. inch), and here it assumed the appearance of a laminated, semi-cartilaginous, dense mass, which was to a great extent calcified, and left only a narrow channel for the current of blood. In the branch which went to the left lobe there was less thickening, although here also there was a considerable degree of constriction. Passing backwards from this, the vessel was enlarged; the end of the trunk of the portal vein was very much dilated and furnished with thick walls, so that it had the appearance of an arterial aneurism. The cœliac and hepatic arteries, and particularly the splenic, were greatly enlarged, and their lining membrane was thickened and wrinkled. The vena azygos was converted into a series of large sacs, filled with blood; some of these sacs extended as far as the splenic vein; the latter vessel also was furnished with saccular dilatations, three of which communicated with the sacs upon the vena azygos. There was thus a varicose anastomosis between the splenic vein and the vena azygos.

Virchow referred the first obstruction of the circulation in the portal vein to the greatly enlarged bile-ducts, and supposed that the gall-stone at a former period, when it was impacted higher up, had, by its pressure, given rise to chronic inflammation of the coats of the portal vein, and that this inflammation had induced the morbid appearances above described.

c. Thrombosis of the portal vein may likewise result from compression of the vessel below the liver by contractile connective tissue, and by tumors of various sorts.

I have already (see Vol. I., p. 191) published an Observation, where, in consequence of a perforating duodenal ulcer, connective tissue became developed round about the portal vein, so as to constrict the trunk of the vessel. In this case the vessel was filled with a laminated thrombus, degenerating in its centre into a cheesy mass; this thrombus extended far into the interior of the liver. Death was here the result of hæmorrhage from the stomach and intestines. The spleen was not enlarged.

In a similar manner constriction and thrombosis of the portal vein are observed to be developed in consequence of chronic peritonitis, as is shown by the following case.

Observation No. XXIV.

Repeated contusions of the Epigastrium.—Persistent, violent pains in the upper part of the Abdomen.—Great distention of the abdomen by fluid.—Enlarged abdominal veins.—Liver small and pressed upwards.—Diarrhœa.—Paracentesis.—Rapid return of the effusion.—Persistent Diarrhœa.—Death by Exhaustion.

Autopsy:—Appearances resulting from Chronic Peritonitis.—Firm adhesions of the Spleen, Liver, and Pancreas to the neighboring organs.—Compression of the Portal Vein by a layer of Connective Tissue.—Firm Thrombus in the Portal Vein.—Liver small and dense.—Tumefaction of the Spleen.—Enlargement of the Mesenteric Veins.—Lividity and Tumidity of the mucous membrane of the Stomach and Intestines.—Opaque, flaky effusion in the Abdominal Cavity.

Johann Greilich, aged 46, was under treatment from the 29th of January to the 7th of February. Eleven years before, the patient sustained a blow from a stick on the epigastrium. The epigastrium became very painful and swollen, and gave rise to frequent vomiting and violent pains in the loins, which, however, did not prevent the patient from going about. He recovered, and remained well until eighteen weeks before admission, when he again fell ill; he stated that this time, also, he had been struck on the epigastrium, when lifting a heavy weight. He experienced violent pain, and observed a swelling in that locality, and he had severe diarrhœa. There were no other symptoms of disease.

Upon examination, the patient appeared to be tolerably well nourished; pulse 84; no jaundice; tongue clean; only slight œdema of the feet. The abdomen was distended in a globular manner, and presented distinct fluctuation. The hepatic dulness commenced at the upper margin of the fourth rib, and in the mammary line measured ten centimètres (3·937 Eng. inches). There was no dulness in the epigastrium. The spleen was pressed backwards and moderately enlarged. The superficial veins in the epigastric region and in both hypochondria were greatly developed; the umbilicus was protruded in a globular manner by the fluid effusion; it was 21 centimètres (8·267 Eng. inches) distant from the xyphoid cartilage, and 19 centimètres (7·48 English inches) from the symphysis.

The cardiac dulness was normal; the sounds of the heart were very deficient in sharpness, but free from bruit. Posteriorly, on both sides of the chest, there was dulness on percussion, extending as high as the eighth dorsal vertebra. Rough vesicular breathing could be heard at both apices.

The urine was free from albumen and the stools were brown.

February 2d.—The abdomen was punctured yesterday, and about 21 pounds of fluid were drawn off. Immediately after the operation it was ascertained that there was no alteration in the small dimensions of the liver. The patient experienced intense pain in the epigastrium, which deprived him of all repose. The fluid drawn off was dirty-yellow and flaky, and it was loaded with albumen. The accumulation of fluid had already returned in a great measure by the evening, and consequently the amount of urine continued very small. Pulse 84. Sleep was prevented by the pains, the mental faculties were unimpaired.

February 3d.—The patient felt somewhat better; the urinary secretion was still scanty; two thin watery stools were passed in the day. The abdomen was now as greatly distended as it was before the performance of paracentesis. The patient complained of intense pains in the hepatic region. Tongue clean; moderate thirst.

February 4th.—Great dyspnœa in consequence of the ascites. Feet very slightly œdematous. Five thin stools.

The diarrhœa persisted, and the patient became more and more collapsed, until death ensued on the 7th of February, the consciousness remaining unimpaired up to the time of the fatal event.

Autopsy.

There was nothing abnormal in the cranium or in its contents.

Both pleural cavities contained about 1½ lb. of clear fluid. The right lung was almost universally adherent.

The mucous membrane of the pharynx and œsophagus was injected and covered with a yellow substance, consisting of the regurgitated contents of the stomach.

The mucous membrane of the larynx and trachea was intensely injected. The thyroid gland was small, and the bronchial glands were melanotic. The left lung was slightly œdematous, and the right extremely so; both were inferiorly in a state of splenisation (*splenisirt*).

There was no morbid change of any importance in the heart or pericardium.

The abdominal cavity contained almost 16 pounds of turbid fluid.

The spleen was surrounded by a firm, completely organized sheath of false membrane, which was developed to a remarkable extent in the hilus. It was intimately adherent to the ribs, and also to the cul-de-sac of the stomach. The splenic artery and vein were pervious and free from coagula.

The organ weighed 0·99 kilogramme (2lbs. 3 oz. avoird.), and it measured 6½ inches in length, 4¾ inches in breadth, and 1⅛ inch in thickness. The splenic parenchyma was dense, very glistening, and congested.

The pyloric portion of the stomach was firmly adherent by abnormal bands. The portal vein was considerably constricted; it presented an angular channel, and was surrounded by firm dense connective tissue; the hepatic artery, which lay close to it, was likewise compressed. The trunk of the portal vein in the fissure of the liver was unusually narrow, and was filled with dark, reddish-brown, crumbling coagula, which extended into the branches within the liver, and here assumed a homogeneous reddish-black appearance. The thrombus was only at one place adherent to the venous wall, which retained its normal smoothness. The capsule of the liver was thickened and adherent to the diaphragm; the size of the organ was somewhat reduced; its parenchyma was uniformly brown and dense. The hepatic veins were free from coagula.

The pancreas was enveloped in dense connective tissue, and was almost completely destroyed.

The mucous membrane of the stomach was of a livid hue, and marked by numerous pigment spots, the remains of hæmorrhagic infiltrations.

The veins in the mesentery and mesocolon were moderately enlarged. The serous membrane of the small intestine was brightly injected; its mucous membrane was blackish; the mucous membrane of the large intestine was of a lighter color; the appendices epiploicæ were œdematous. The intestinal contents were fluid and pale-yellow. The cavity of the pelvis contained a purulent fluid.

The kidneys were congested, but were in other respects normal. The urinary bladder was empty.

An analogous observation has been recorded by Barth (*Bulletin de Société Anatomique*, 1851, p. 354). The case was that of a female, 24 years of age, who died of chronic peritonitis ten months after her accouchment. The abdominal cavity was found filled with turbid fluid. The portal vein, before its entrance into the liver, was surrounded by a white, dense connective tissue; its branches were filled with coagulum.[1]

An obstruction, limited to the mesenteric vein, is sometimes produced in consequence of inflammation of the mesentery, when the inflammatory process attacks the coats of the vein, or when the channel of the vessel is narrowed by the contractility of the surrounding connective tissue. Cohn (*Embolische Gefässkrankheiten*, s. 688) has recorded an observation of this nature.

The portal vein below the liver is constricted, so that the blood coagulates in its interior, by morbid growths, much more frequently than by the occurrence of peritonitis. These morbid growths are for the most part cancerous tumors, which are developed in the stomach, pancreas, omentum, or retro-peritoneal glands; or tubercular deposits in the retro-peritoneal glands. Gendrin (*Traité de Médic. Pratiq.*, T. I., p. 233) and Bouillaud (*Archiv. Gén. de Méd.*, T. II., pp. 198 and 199) have described cases of this nature, where the trunk of the vein was found obstructed. Several other cases have come under my own observation, where coagula have been developed in the branches of the vein, as for example in the splenic vein in the case of cancer of the pancreas, in the superior mesenteric vein, in the case of cancer of the omentum and of the retro-peritoneal glands, &c. The process usually commences in the small ramifications, and from them a globular thrombus proceeds,[1] which gradually increases in extent, and from which fresh coagula are prolonged, without, as a rule, completely filling up the channel of the vessel.

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[1] See also Ziegler, *De Venæ Portæ Obstructione.* Diss. Inaug, Regiomont, p. 26.

That form of obliteration which is limited to individual branches of the portal vein is particularly interesting, as the obliteration induces an atrophy of the corresponding parts of the hepatic parenchyma. Depressions are found upon the surface of the gland, which are formed by a callous fibrous tissue, and which not unfrequently are so numerous that the organ presents a lobulated appearance.[2] On tracing the portal vein, it is found that the branches leading to the cicatrix-like depressions are obliterated.

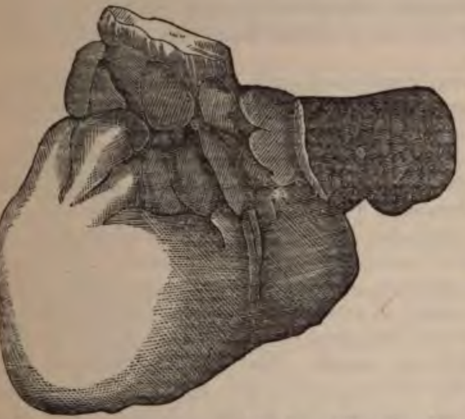

FIG. 17.—Lobulated liver resulting from obliteration of individual branches of the portal vein.

The mode of development of this process of obliteration is still not sufficiently explained. I have observed it several times in conjunction with old tumefaction of the spleen, in cases where there has been persistent intermittent fever, and I have thought it probable that the closure of the branches of the portal vein was due to the immigration of coagula from the spleen and other sources of the portal vein. I have been unable, however, to adduce any certain proof of this. Schub (*Zeitschrift der Gesellschaft der Aerzte in Wien*, 1846, Bd. II., s. 353) has recorded two cases of this nature, one of which may find a place here.

J. Schenk, aged 39, a butcher, of robust constitution, was never ill during his childhood, with the exception of an attack of intermittent fever, in his ninth year. For seven years he had suffered frequently from pains in the hypochondria, and for several weeks this pain had been persistent and accompanied by fever. The complexion was earthy. The spleen and

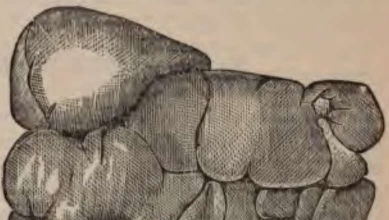

FIG. 18.—Lobulated liver (congenital).

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[1] Under such circumstances the thrombus may either be simple, or it may contain the elements of cancer. Bamberger (*op. cit.*, p. 635), moreover, mentions an instance of an endogenous formation of cancer in the portal vein, which was developed without any cancerous deposit being present elsewhere in the body. The whole of the portal vein, as far as its finest ramifications, was filled with a pultaceous coagulum, which consisted of large nucleated cells of various forms. See also Virchow, *Archiv f. Pathol. Anat.*, Bd. II., s. 597.

[2] See Fig. 17, which represents a liver, in which the posterior part of the right lobe is furnished with cicatrix-like depressions, formed in the manner above stated. This must be distinguished from the lobulated character of the liver which results from circumscribed hepatitis (see Fig. 8, p. 170), and also from the rare congenital form of division into lobules, of which Fig. 18 is an example.

liver were tender upon pressure, and were both enlarged. The patient had an attack of intermittent fever daily in the afternoon. Leeches, and subsequently cataplasms were applied to the splenic region, and after a time Quinine was administered. Ascites was gradually developed, and after several weeks the patient had a fresh attack of fever, with great tenderness of the spleen and rapid increase of the ascites. Calomel was prescribed. The fever exhibited distinct intermissions, and there was a temporary diminution of the effusion in the abdominal cavity. The liver was reduced in size.

Subsequently the fever became continued, and the abdomen painful: vomiting of green matter supervened, and death occurred in the sixth month after the patient's admission into Hospital.

Several pounds of a yellow flaky fluid were found in the abdominal cavity. The peritoneum was opaque and thickened, and in some places injected and covered with exudation. The liver was small; the anterior margin of the right lobe was atrophied; several deep, cicatrix-like depressions were observed upon the convex surface of the gland. The glandular tissue was brown and tenacious, and broken up into little lobes, from the size of a millet-seed to that of a bean, which were surrounded by fibrous tissue. Several of the main branches of the portal vein were obliterated and surrounded by fibrous bands. The spleen weighed four pounds, and extended as far down as the pelvis; the splenic parenchyma was reddish-brown and softer than natural, but at one place, the size of a fist, near the lower extremity, it was denser and hard, and it contained a bloody infarctus.

I have repeatedly met with extensive obliteration of the hepatic branches of the portal vein, without any sign of hepatic disease, such as ascites, &c., having been present.

2. *Symptoms of Obstruction of the Portal Vein.*

The process of obstruction of the portal vein is not usually indicated by any local symptoms; and it is only in exceptional cases that the inflammation of the venous wall becomes so acute as to induce pain. The clinical history of the disease is, in most cases, as follows:—

After a long continuance of the symptoms characteristic of those affections which lead to diseases of the portal vein, such as cirrhosis, chronic atrophy, cancer of the liver, chronic peritonitis, and cancer of the stomach or of the other abdominal organs, the signs of extensive obstruction in the region of the body, in which the roots of the portal vein take their origin, suddenly make their appearance; ascites is developed, which in a few days attains an extraordinary amount, and which immediately returns after the performance of paracentesis; the superficial veins of the abdominal parietes enlarge and extend in the form of thick cords from the abdomen, over the lower part of the thorax towards the axillæ; at the same time the spleen increases in size; diarrhœa supervenes, of a watery, or often likewise of a bloody, character, and not unfrequently it is accompanied by vomiting; the urine becomes unusually scanty and dense; the patients decline rapidly, and present a pale cachectic appearance; the feet become œdematous, &c.

These symptoms are not always developed with equal severity; they are more or less strongly marked according as the obstruction of the portal vein is complete or incomplete, or takes place suddenly or slowly, and according as the obstruction is compensated for or not, by the collateral channels of circulation.[1]

An analysis of 28 observations of obstruction of the portal vein, in reference to the symptoms, has yielded the following results:—

Ascites was absent in only three cases. In a man who died of very profuse hæmorrhage from the stomach and bowels, I failed to observe either ascites or enlargement of the spleen, notwithstanding the complete occlusion of the trunk and branches of the portal vein. Here the hæmorrhage compensated for the serous transudation, which would otherwise have resulted from the obstruction.

Handfield Jones likewise observed no ascites in a female who had cirrhosis and obstruction of the portal vein, but who had suffered from hæmatemesis (*Medical Times and Gazette*, August, 1855, p. 184).

The network of superficial abdominal veins occurred 13 times in the 28 cases; it was most strongly developed in the observations of Reynaud and Stokes, in which the vena cava was occluded, as well as the portal vein.

Tumefaction of the spleen was absent in four cases, partly because the organ was atrophied or in a state of wax-like degeneration, and partly because the pressure of blood was relieved by hæmorrhage.

In contrast with the spleen, the liver was found to be of normal size or enlarged in only four cases, and in most of these cases cancer of the liver had preceded the obstruction of the portal vein. Jaundice, likewise, was only observed in four cases.

As regards the symptoms referrible to the gastric and intestinal functions, diarrhœa was present in all the cases with the exception of three, and in one-third of the cases the evacuations were either mixed with blood, or consisted of pure blood. Bloody vomiting was of rarer occurrence, and was only observed in four of the cases in which there was hæmorrhage from the bowels. The remaining symptoms, such as the dyspepsia and the diminution of urine, are of subordinate importance, and are easily accounted for.

3. *Diagnosis.*

The diagnosis of obstruction of the portal vein follows from the symptoms above mentioned. It may be arrived at with certainty, when the symptoms of obstruction are collectively present; when several of these symptoms are absent the diagnosis is more difficult. In the latter case, according to the observations which I have been able to collect, the most reliable indication of obstruction of the portal vein, is the extraordinary rapid return of the ascites after the performance of paracentesis; this does not take place with the same rapidity, when the dropsy results from any other cause.

4. *Progress and Prognosis.*

The termination of the disease is, perhaps, without exception, fatal. We possess no authenticated facts to show whether the obstruction can be compensated for by the collateral channels of circulation, so as to maintain life; at all events it is only in the simple forms resulting from chronic peritonitis, and not in those which are accompanied by degenerations of the liver, that we can think of such a compensation.

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[1] For an account of the collateral channels, see Vol. II., pp. 81 and 83.

The prognosis follows from what has just been stated.

5. *Treatment.*

The object of treatment is to limit, as far as possible, the derangements which result from the occlusion.

We must endeavor to moderate the diarrhœa, as well as the hæmorrhage from the stomach and intestines, by means of Ratanhy, Tannic Acid, and the other astringents, to prevent loss of strength by easily digested, concentrated nutriment, and to keep in check the ascites. For the last-mentioned object, it is useless to have recourse to diuretics, because it is impossible to excite the functions of the kidneys, owing to the diminished pressure of arterial blood; there is far more reason to apprehend injurious consequences to digestion from their employment. The use of drastic purgatives for the ascites would only promote the exhaustion. Nothing else remains than to perform paracentesis, which, however, ought to be postponed as long as possible, and not to be repeated until the dyspnœa becomes dangerous.

The occlusion of the portal vein by means of gall-stones (Jacob Camenicenus and Devay), as well as the occurrence of the distoma hepaticum in this vessel, will be mentioned under the heads of Gall-stones and Entozoa in the Bile-ducts.

Along with obstruction of the portal vein, we may consider, in the first place, dilatation of the vessel, and secondly, those forms of disordered nutrition of its coats, which are more or less related to chronic pylephlebitis —viz., calcification, fatty degeneration, and rupture of the portal vein.

DILATATION OF THE PORTAL VEIN.

The trunk, the branches, or the roots of the portal vein may be dilated, but it is rare that the entire vessel is observed to be in this condition.[1]

The cause of the dilatation in this, as well as in other veins, is either some impediment to the circulation of the venous blood, or a disordered nutrition of the coats of the vein resulting from chronic phlebitis.

Hence, dilatation of the portal vein commonly accompanies the destruction of numerous capillaries of this vessel in the interior of the liver, in Chronic Atrophy (see Vol. I., pp. 182 and 183, where several cases of this nature are recorded), and also in Cirrhosis (Vol. II., p. 73). A rare example of dilatation from the latter cause has been recorded by Linas (*Bullet. de l'Acad. de Méd. de Paris.* 1855, Oct.).

A male, aged 18, who had an attack of typhoid fever two years before, died from dysentery. The liver was cirrhotic, shrivelled, atrophied, and yellowish-brown. The spleen was enlarged, and weighed two kilogrammes (4 lbs. 6½ oz. avoird.). The abdominal veins were tortuous, and alternately dilated and constricted; the splenic, mesenteric, epigastric, and external iliac veins were as large as the inferior vena cava; but the cutaneous veins were only moderately dilated. Bloody exudations were found throughout the whole intestinal canal; the intestinal glands were swollen; and the rectum was intensely inflamed. The abdominal cavity did not contain a single drop of fluid.

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[1] We find but few examples of dilatation of the portal vein recorded in the earlier writings. To this head belong the cases already mentioned, which were observed by Meibomius, Mercatus, and Martin, the instances cited by Stahl-Gaetke from Vesalius, Wedel, Stange, and Hiller, and also a notice in Portal (*Maladies du Foie*, p. 37). Portal's case was that of a man who had suffered for a long time from hypochondriasis, vertigo, abdominal pulsation, and bleeding hæmorrhoids, and in whom death was preceded by delirium and convulsions. The liver and spleen were found to be very large; the portal vein was distended to the size of the small intestines, which were of a livid hue, as if gangrenous.

A similar effect results from occlusion of the portal vein by means of thrombi (Carswell), by cancer (see p. 395), and by concretions (Devay).

The varicose form of dilatation is much rarer than the uniform. I have met with varicose enlargement of the veins of the stomach only once, in a case of occlusion of the portal vein. I have several times observed varices in the small intestine, resulting from the compression and obliteration, which the mesenteric veins had undergone from cords of connective tissue, developed in consequence of inflammation of the mesentery. The mucous membrane of the small intestine, which, at this place, was strangulated, was of a dark-blue color, and covered with dark mucus as far as the roots of the compressed veins extended.

Virchow, in the cases of constriction and ossification of the portal vein, already alluded to, has made mention of varices of the splenic vein, the coats of the vessel being in some cases attenuated, and in others thickened; the circumference of the branches of the splenic vein in the neighborhood of the hilus measured from 2 to 2½ centimètres (¾ to 1 Eng. inch), that of the trunk from 5 to 7 centimètres (2 to 2¾ inches), and that of the portal vein 7 centimètres (2¾ inches).

Ossification or Calcification of the Portal Vein.

There are numerous observations which prove that the walls of the portal vein may, under certain circumstances, become calcified.[1] Usually we find only isolated calcareous scales, imbedded in the lining membrane, or in the middle coat; in rarer cases the wall of the vessel is calcified over a great extent, or in the form of a ring, and even the external coat is implicated. The plates have a smooth surface; they are thickest at the centre, and become thinner towards the margins. The diseased vessel, in addition to the calcareous plates, presents thickened, cartilaginous-looking places, similar to those which are found in atheromatous arteries. Virchow (*Op. cit.*, p. 24) observed the inner wall of the portal vein, at its entrance into the liver, gradually increased in thickness to one centimètre, and here it consisted of a distinctly-laminated, semi-cartilaginous mass, which was to a great extent calcified. This form of degeneration of the wall of the portal vein must be attributed to a chronic form of inflammation, such as occurs in the analogous processes of the arteries. Calcification of the portal vein is found under circumstances which induce *pylephlebitis chronica* during life; it occurs more particularly in cases of obstruction of this vein, whether resulting from cirrhosis or from chronic peritonitis, or from inflammation of Glisson's capsule.

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[1] The most important of these observations are the following:—Ruysch (*Observ. Anat.*, No. LXX., Thes. No. 58) found the portal vein partially ossified, in the body of a dropsical person who had tubercles of the peritoneum, and he caused a drawing to be made of the preparation (*Observ. Anat.*, Fig. 58). Otto (*Pathol. Anat.*, s. 358), Breimayer (*Museum Anat.*, *Path.*, Vindob., p. 102) and Rokitansky (*Path. Anat.*, Bd. I., s. 656) have described preparations of ossification of the portal and splenic veins in the Vienna Museum. Lobstein (*Phœbus de Concrementis Venarum Osseis et Calculosis. Comment. pro ven. doc. Berol.*, p. 6) observed the inner surface of the sinus of the portal vein affected over a great extent, in a manner similar to an artery. Bourdon and Piedagnel (*Brachet*, *Encyclop. des Sciences Médic.*, T. V., p. 86, Paris, 1835) met with complete ossification of the portal vein in the body of an individual, who had enlargement of the spleen, and had suffered from hæmorrhage from the stomach. Pressat (*Gaz. Méd.*, 1836, p. 346), in a case of cancer of the stomach, saw calcareous deposits in the walls of the portal vein, which was filled with a mass of medullary matter. More recently, Raikem (*Mémoires de l'Académ. Royal. de Méd. de Belgique*, T. I., p. 38). Frisson, Dowel, Gintrac, and Virchow, in the memoirs already referred to, have given careful descriptions of ossifications of the portal vein, which coexisted with obstruction of this vessel. Oppolzer and Bamberger have likewise recorded observations of a similar nature.

It is remarkable that fatty degeneration is scarcely ever observed coexisting with the calcification; whilst, in the case of the arteries, the former affection is the more common. But, that the coats of the portal vein may become the seat of fatty degeneration, is clearly shown by Observation No. XXV.

RUPTURE OF THE PORTAL VEIN.

Rupture of the portal vein is a rare event, and but few cases are found recorded in medical literature.[1] I once had an opportunity of observing a patient, whose death resulted from this cause. In this case the wall of the portal vein was at some places in an advanced stage of fatty degeneration.

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[1] Andr. Vesalius (*Epistola de Radice Chynæ; Opera Omnia.* Lugdun. Batav., 1725, Vol. II., p. 674) has recorded the autopsy of a lawyer, who died suddenly during a meal. "Quumque ipsum dissecarem, reperi mox universum corporis sanguinem, adhuc impense calidum, in peritonæi amplitudinem confluxisse. Hujus sanguinis fluxui occasionem præbuerat induratus quidam in venæ portæ caudice abscessus, qui parte quadam suppuratus, effractusque sanguini viam dederat." The liver was granular, and the spleen was very large. Schenk (*Observ. Med. Rar.*) found the stomach half-filled with blood, and a rupture in the portal vein on the concave surface of the liver, in the body of a man aged 54, who had suffered a long time from gastralgia and melæna. Testa (*Delle Malattie del Cuore*) cites an observation from Folchi, of a young maiden who died suddenly after supper. The abdominal cavity contained a quantity of bloody fluid; the intestines were covered with large coagula of blood; the portal vein, which, at its entrance into the liver, appeared enlarged, presented a gaping wound, half-an-inch in length. All the other organs were normal.

Meli (*Sulle Febbri Biliose*, 1822), Lobstein (*Traité d'Anatomie Pathol.*, T. II., § 1127) found a rupture eight lines long, with indented margins, at the autopsy of a man who had died of bilious fever. The coats of the vessel were softened, and might be divided by the pressure of the fingers.

Toulmouche (*Archiv. de Méd.*, 3^{me} Sér., 1857, Oct., p. 228) met with a patient, who had suffered from epileptic attacks, and who died from rupture of the splenic vein. This vessel had very thin, intensely red walls, and the rupture had taken place, where it split up into large branches, before entering the spleen.

OBSERVATION No. XXV.

Disordered Digestion.—Symptoms of Cramp of the Stomach.—Diarrhœa.—Abuse of Spirits.—Violent Pain.—Sensation of Rupture at the Epigastrium.—Prostration.—Symptoms of Internal Hæmorrhage.—Death two days afterwards.

Autopsy:—Copious Extravasation of Blood between the folds of Peritoneum surrounding the Portal and Splenic Veins.—Extensive Fatty Degeneration of the Walls of the Portal Vein and of its branches.—Advanced Fatty Degeneration of the Pancreas.—Fatty Liver, with Hypertrophy of its framework of Connective Tissue.

Otto Pfennig, aged 41, lithographer, was admitted into All Saints' Hospital on June 6th, 1856, and died on the 8th of the same month.

The patient, who was a pale, emaciated man, stated that he had suffered for a long time from disordered digestion and from frequent attacks of cramp of the stomach, as well as from obstinate diarrhœa, and that he had repeatedly been jaundiced. For several years his stomach had only been able to tolerate easily-digested food, and he had always suffered severely for every error in diet. For several months he had brought up a large quantity of blood without any cough. He confessed to having been addicted to the use of brandy. The disease, for which he came into the Hospital, had only existed for twenty-four hours. On the morning of June 5th, during an attack of cramp of the stomach, he experienced the sensation as if something had ruptured in the upper part of the abdominal region and discharged a fluid. Immediately afterwards he became very feeble; he was unable to maintain the erect posture, and he fell into a state of great prostration.

On the 6th of June, when the patient was examined for the first time, he complained of violent cramps in the calves of the legs, and likewise of pains in the pyloric and ileo-cœcal regions. The consciousness was unimpaired; the countenance was cyanotic; the extremities were cool and pulseless. The abdomen was tensely distended; the diaphragm was displaced upwards to the extent of one intercostal space. The liver was situated so that only its margin was opposed to the ribs in front, and it could not be made out on examination. No fluid effusion could be discovered in the abdominal cavity. Of the thoracic organs the heart was normal; at the apex of the left lung there was circumscribed dulness and indistinct breathing. The urine was very scanty and free from albumen and bile-pigment.

Cold applications to the abdomen and laudanum internally were prescribed.

On June 7th the patient complained of pains in the ileo-cœcal region; the abdomen was tensely distended; the extremities were cold; there was vomiting of a greenish fluid; two gray clay-like stools. In the afternoon the consciousness became impaired; towards evening there was somnolence, and death occurred about 7 o'clock (of the following morning, June 8th?) Towards the last the skin presented somewhat of a yellowish tint.

Autopsy, 20 *hours after death.*

There was nothing abnormal in the brain or its ventricles. The mucous membrane of the air-passages was slightly injected. The bronchial glands were large, and loaded with pigment. There were firm adhesions over the left lung, the apex of which contained disseminated tubercles; the right lung was free from tubercles. The heart contained a firm yellow coagulum; its muscular tissue and valves were normal.

The stomach and intestinal canal were greatly distended with gas. The liver was pushed high up, and its sharp margin was opposed to the ribs. Below the liver there projected a reddish-brown tumor, reaching to the gall-bladder; a similar tumor was observed in the left hypochondrium, on the inner surface of the spleen. On closer examination it was ascertained that these tumors were formed by blood, partly coagulated and partly fluid, which was deposited between the separated layers of the lesser omentum, of the hepato-duodenal and gastro-splenic ligaments, and of the mesocolon. The extravasation extended on both sides downwards as far as the kidneys, and reached transversely across the abdominal cavity, from the fissure of the liver along the pancreas to the hilus of the spleen. The trunks, as well as the smaller branches of the portal and splenic veins, presented a peculiar alteration of their vascular coats. This consisted in an extensive sulphur-yellow discoloration, which, on microscopic examination, was found to be due to a far-advanced fatty degeneration. The yellow portions of the vascular membrane were soft and very lacerable. No rupture could be discovered in the trunk of the portal or splenic veins to account for the hæmorrhage; but on tracing the smaller branches of the splenic vein, more especially the *venœ gastricœ breves*, they became lost in the mass of coagulum; the same was the case with several of the venous branches opening into the *vena coronaria dextra.* Nothing abnormal could be discovered in the aorta, the cœliac axis or its branches, or in the ascending vena cava.

The pancreas was large and flabby; upon section of the gland, there was observed a network of yellowish-white, broad and narrow streaks, which consisted for the most part of oily globules and granules; in the head of the pancreas there was a larger mass of the same nature, which presented a puriform appearance, and was composed of fatty débris. In the neighborhood of this mass a small vein was found opening into the portal vein, which was closed up by a red, at some places already decolorized blood-clot; the yellow walls of this vein were in a state of advanced fatty degeneration. Round about the vessel were large masses of coagulated blood. The lining membrane of the pancreatic duct was covered with a soft, fatty layer.

The liver was enlarged, flabby, and tenacious, and of a bright yellow color. The connective tissue of the gland was hypertrophied, and the hepatic cells contained much oil. The gall-bladder was distended with dark bile. The spleen was small, reddish-brown, and soft.

The stomach contained yellow mucus. Its lining membrane was pale.

The serous membrane of the small intestine was of a slaty-gray hue. The mucous membrane was livid and tumid, and permeated by large veins. The large intestine contained firm, gray fæcal matter. Some portions of the mucous membrane, more particularly in the neighborhood of the extravasated blood, was reddish-brown.

The kidneys were anæmic, but in other respects normal.

B. SUPPURATIVE INFLAMMATION OF THE PORTAL VEIN.

PYLEPHLEBITIS SUPPURATIVA.

1. *Anatomical Characters.*

In suppurative inflammation of the portal vein, the changes, which the coats and contents of the diseased vessel undergo, take a different direction from that of the adhesive form of phlebitis and the thrombosis, above described.

The channel of the vein is found to be enlarged and gaping upon section; the wall of the vein is thickened, softened, and infiltrated with exudation. Increased vascularity, or an infiltration with serous, fibrinous, or purulent matter, is observed even in the sheath of the vessel. The middle coat of the vein is altered in a similar manner. The inner coat presents a discolored, red, brownish, or greenish-yellow, dull, wrinkled, and, not unfrequently, torn appearance, and is covered with fibrinous layers, or fluid pus.

The thrombus, in the interior of the vein, undergoes destruction at an early period. It softens from the centre into a dirty grayish-red pulp and afterwards dissolves more or less completely into a purulent fluid.[1]

These alterations of the vein are most distinctly developed, sometimes at one part of the portal vein, and sometimes at another, according to the locality where the disease commences, and its cause; it does not, however, remain circumscribed, but spreads over extensive tracts of this portion of the venous system. As a rule, the hepatic branches of the portal vein are implicated. Their channel is found blocked up with coagulated blood, fibrinous matter, or pus, as far as their finest ramifications, or they appear distended and filled with purulent fluid, so that cavities resembling abscesses are seen on section. Not unfrequently metastatic deposits are developed, as in other forms of phlebitis, by particles of thrombi being floated by the blood into the liver; these deposits are found in various stages of development, from reddish-brown infarctions to yellow cavities of pus. The metastatic formations rarely extend beyond the liver. Out of 25 cases, there were only four with pyæmic deposits in the distant organs. Dance found pus in the parotid, in the deltoid muscle, in the shoulder-joint, and in the lung; Waller found it in the brain, the kidneys, and the lungs; Breithaupt in the spleen, &c.

Participation of the roots of the portal vein in the morbid process is still less constant. Cases are met with where they are all more or less diseased, and filled with coagulated blood, fibrin, or pus; while, in other cases, several of the roots remain exempt; and in others, the inflammatory process is seen to have passed through its various stages. This mainly depends upon the locality where the pylephlebitis has commenced, and upon the causes which have given rise to it.

2. *Ætiology.*

Suppurative inflammation of the portal vein is almost invariably a consecutive lesion, resulting from suppurative processes in the organs, in which the roots of the portal vein originate, or through which the vessel takes its course. Cases are rare in which such a mode of origin cannot be discovered, or where the disease is induced by an external injury, such as a wound.

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[1] Mere redness of the inner coat of the portal vein does not suffice to determine an inflammation. We cannot, therefore, refer to pylephlebitis the observations recorded by Andral (*Clinique Méd.*, T. IV., p. 291), in which there was only this sign present, in conjunction with chronic inflammation of the intestinal canal.

According to the observations hitherto made, suppurative pylephlebitis may proceed from the following causes:—

a. *Injury of the Portal Vein.*

Medical literature contains but a single observation of traumatic pylephlebitis, which is recorded by Lambron (*Archiv. Gén. de Méd.*, 1842, p. 129), and which, from its presenting the disease in its simplest form, may be quoted here.[1]

Franz Roussy, aged 69, a day-laborer, was a patient in La Pitié from the 6th to the 30th of June.

He stated that for some weeks he had suffered from symptoms of indigestion, nausea, and constipation, and that eight days before he had taken an emetic on account of these symptoms, but without any good result. On the day of his admission into the hospital he was seized with an attack of rigors, accompanied by an inclination to vomit, and great restlessness.

Upon examination, the pulse was found to be almost normal; there was no impediment to the respiration; the tongue was white; there was a tendency to vomit, together with constipation, and a feeling of uncomfortableness in the right hypochondrium, which occasionally became aggravated into severe pain, but there was no tenderness upon pressure in this region. The liver and spleen were of normal size. All the remaining functions were healthy. Wine-lemonade and a low diet were prescribed.

On the 7th of June the pains in the right hypochondrium increased in severity, and greatly exhausted the patient. The tongue was covered with a whitish coat, and there were repeated attacks of vomiting. There was no tenderness upon pressure on the epigastrium; the bowels were still confined. Tartar emetic was prescribed.

On the 8th of June the patient was worse. The pains during the day were very violent. The skin and conjunctiva had assumed a slight yellowish tint, but the urine presented no marked yellow color.

On the 11th of June the pains in the right hypochondrium persisted, and from time to time underwent exacerbations. The jaundiced color of the sclerotic and skin was more distinctly pronounced. To-day the urine, for the first time, yielded the reaction of bile-pigment, when tested with nitric acid. Orders were given to draw 200 grammes (about 7 oz. avoird.) of blood from the region of the liver, by cupping.

On the 12th of June the pain was less severe, but the patient had an inclination to vomit, and in the evening had an attack of rigors, followed by heat and sweating. The tongue was dry, and covered with a blackish coat; the patient suffered from hiccup, and passed several thin watery stools. Pulse 96. There was no obvious enlargement of the spleen. Sulphate of Quinine was prescribed in doses of 20 centigrammes (3 grains).

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[1] To the traumatic form of pylephlebitis may likewise be referred the inflammation which spreads in newly-born children, from the ligatured umbilical veins to the trunk and right branch of the portal vein, and, in rare cases, also to the roots of this vessel—the splenic, pancreatic, and mesenteric veins. This form of inflammation was already described by Ph. F. Meckel and Sasse (*Dissertatio de Vasor. Sanguiferorum Inflammatione*, Hal., 1777). It leads at one time to occlusion of the portal vein, or of its right branch, and at another to suppuration and general peritonitis. See Bednar (*Krankheit. d. Neugeborenen*, Bd. III., s. 174); F. Weber (*Path. Anat. der Neugeborenen*); H. Meckel (*Annal des Charité-krankenhauses*, Bd. IV., s. 218).

On the 13th of June the condition of the patient was almost the same as the day before. He had several attacks of rigors in the night; the hot stage had ceased, and the sweating was less profuse. There was still slight fever in the morning; pulse 80; occasional hiccup. Blisters to the region of the stomach, Sulphate of Quinine in doses of 20 centigrammes (3 grains), and beef-tea, were prescribed.

On the 15th of June, notwithstanding the administration of the Sulphate of Quinine, the febrile exacerbations continued, with more or less regularity in their three stages. The hiccup, the jaundice, the pains in the right hypochondrium, the absence of any lesion in every other organ, and the almost normal volume of the spleen, favored the diagnosis of phlebitis in the liver.

For several days after, there were no changes of importance in the symptoms. Magnesia-water was prescribed.

On the 24th of June the patient felt somewhat better, and had a desire to eat. In the evening he had a violent rigor, but on this occasion the paroxysm did not exhibit distinct stages, the shivering taking place at the very time that the body was covered with copious perspiration. The urine contained much less bile.

On the 25th of June there was no perceptible abatement of the fever, which appeared to have a tendency to become continuous. The skin was covered with perspiration. The tongue, which, for some days before, had been moist, again became dry, while, at the same time, the patient complained of a return of the pains, which had ceased for five or six days.

On the 26th and 27th of June fresh attacks of rigors made their appearance, sometimes along with hiccup. The pulse was hard and tolerably full. On auscultation, bronchial breathing, and crepitation were discovered at the base of the right lung. The patient was in a state of great prostration. A blister was ordered to be applied to the right side of the chest.

The prostration continued to increase on the two following days, and was accompanied by slight delirium; pulse 104, small and soft. Death occurred during the night between the 29th and 30th of June.

Autopsy, 30 *hours after death.*

Slight jaundiced tint of all the tissues. No effusion in the abdomen.

The size of the liver was normal. Its color was dark greenish-yellow. Adhesions existed at several places between its serous covering and the under surface of the diaphragm. The gall-bladder was likewise adherent at some places to the neighboring parts; it was of the usual size, and filled with normal bile.

On making an incautious section of the vascular pedicle of the liver, a reddish sanious fluid, mixed with a few small flakes of pus, escaped from the vessels, and especially from the bile-ducts, which were found to be somewhat enlarged. On opening the duodenum the orifice of the ductus choledochus was ascertained to be normal, and thick yellowish bile escaped from the diverticulum of Vater;[1] moreover, there was nothing abnormal along the course of the ductus choledochus. On laying open the portal vein, a fluid, resembling the lees of wine, flowed out; and on retracing the mesenteric roots of this vessel, a foreign body, which was at once discovered to be a fish-bone, was found in the trunk of the superior mesenteric vein. This bone was impacted in the head of the pancreas, penetrated the anterior wall of the mesenteric vein obliquely from above downwards and from before backwards, traversed its interior, and was lodged in the posterior thickened wall of this vessel, to the depth of one or two millimètres. Its length amounted to about three centimètres (1·18 English inch); its thickness equalled that of a large pin; it was of a yellow color, hard and resistent; the extremity that stuck in the vessel was twisted like a corkscrew.

The mesenteric vein, at the part corresponding to the situation of the ulceration produced by this foreign body, had its channel blocked up by exudation of a slaty-gray color. The exuded matter was intimately adherent to the wall of the vessel, and extended from the openings of the small veins which came from the upper part of the jejunum, as far as the junction with the splenic vein. A portion of the exudation extended still further, and floated a little above the junction of the splenic vein, so as to close up almost one-half of the opening of this vessel. Above this obstruction, the subdivisions or roots of the mesenteric vein were healthy, and only contained fibrinous coagula, several inches in extent. The splenic vein had its normal caliber, color, and consistence; but it contained a quantity of fluid, colored like the lees of wine, similar to what was noticed on opening the portal vein. This fluid probably did not flow into the otherwise healthy splenic vein until after death, and perhaps not until the *post-mortem* examination.

On the posterior wall of the stomach, about one centimètre (·3937 Eng. inch) removed from the pylorus, was a brownish spot, one millimètre in diameter, which corresponded to the free extremity of the fish-bone, and which presented a small depression in its centre. The peritoneum at this part, however, was smooth, and exhibited no trace of adhesions. There was no deposit of brown pigment in the mucous membrane surrounding the spot, but a small opening was observed in it, into which the point of a pin could be easily made to enter. On inserting a swine's bristle this was found to be the opening of a small channel, which perforated almost the entire thickness of the wall of the stomach, but terminated in a blind cul-de-sac.

Although this channel was no longer pervious, and the serous membrane of the stomach presented no adhesions (which had without doubt been torn by the efforts of vomiting), it was, nevertheless, certain that the fish-bone had perforated the stomach at the above-mentioned place, had passed through the head of the pancreas, penetrated into the anterior wall of the trunk of the vena mesenterica magna, and, by entering into the channel of this vessel, had given rise to the morbid appearances above described.

The trunk of the portal vein, although not obliterated, was found to be narrowed by exudation, which adhered but loosely to the somewhat thickened venous walls. On tracing the ramifications of this vein in the anterior of the liver, some of them were found to be filled with a fluid like wine-lees, similar to that contained in the trunk, whilst its walls were at one part sound, and at another inflamed and thickened, and at several places exhibited a slaty gray exudation. Other branches contained only a coagulum of blood, which was prolonged into the finest subdivisons of the vein; while others again were perfectly normal.

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[1] The diverticulum formed by the junction of the ductus communis choledochus and the pancreatic duct.—TRANSL.

The liver contained no metastatic abscesses, but its tissue in the neighborhood of the sinus of the portal vein was much softened.

The hepatic veins were perfectly normal, and contained but very little blood.

There was nothing abnormal in the kidneys, spleen, or intestinal canal.

There was slight hypostatic congestion of the right lung, but no metastatic deposits were found in either lung. The heart was rather large, and contained some coagulated blood. The coagulum in the right ventricle was fibrinous, and was prolonged into the pulmonary artery.

b. *Ulcerative processes in the Intestinal Canal and Stomach.*

Ulcerations of the intestinal canal and stomach constitute the most frequent starting-point of the disease. Of twenty-five cases, eight originated in this way. These ulcerations arise most frequently from the inflammatory processes, which are induced in the appendix vermiformis and cæcum by the retention of hard fæcal matter, or of foreign bodies, such as splinters of bone, fish-bones, gall-stones, &c., and by deep, or often perforating ulcers, with circumscribed purulent peritonitis.

In this case the inflammation attacks the roots of the ileo-cæcal vein, and phlebitis is developed, which remains circumscribed, or is propagated to the trunk of the portal vein.

Metastatic deposits, or the morbid appearances of phlebitis, advancing towards such deposits, are found in the liver.

Several cases of the disease, which have been recorded by Mohr (*Med. Centralzeit.* IX. Jahrg. No. 29), Waller (*Zeitschrift d. Gesellsch. der Aerzte* in Wien, III., 1846, p. 385), and Buhl (*Zeitschrift f. ration. Medicin.* 1854, s. 348), will elucidate still further the relations between ulceration of the intestines and purulent pylephlebitis.

The observation of Mohr referred to a maid-servant, 17 years of age, who was admitted into the Hospital at Wurzburg, with symptoms of gastric fever. The fever presented remissions, so that it was believed to be a tertian intermittent, although it was remarkable that a brief rigor was followed at once by a profuse and continued sweat. The bowels were at one time confined, and at another relaxed; aphthæ were developed upon the tongue, which were followed by ulcers. The tertian type of the fever was converted into a double quotidian, and this was accompanied by frequent diarrhœa and profuse sweats.

About the fourth week of the disease, fresh aphthæ were developed; the abdomen became distended and tender upon pressure, the stools were thin and bilious. Subsequently, the stools assumed a flaky character; the abdomen became fluctuating; and there was vomiting, with colliquative sweating. Death occurred in the sixth week of the disease, the consciousness remaining unimpaired to the last.

Autopsy.

The abdominal cavity contained much purulent fluid; the serous membrane of the intestines was marked with reddish-brown patches. The liver was large, and contained six abscesses, filled with tenacious pus and formed by enlarged branches of the portal vein. All the branches and ramifications of the portal vein were filled with pus. The ileo-cæcal vein was enlarged and thickened; its lining membrane was of a dark hue, and covered with purulent fluid; some of its branches contained fibrinous plugs. The appendix vermiformis of the cæcum was distended to the size of a finger and infiltrated with pus; its mucous membrane was of a slaty-gray color. The spleen was firm, and not enlarged. The walls of the intestines were thickened, and covered with flaky fluid. Peyer's glands were injected.

This case was remarkable, inasmuch as jaundice, delirium, and tumefaction of the spleen, the ordinary symptoms of purulent inflammation of the portal vein, were wanting.

Waller has recorded the case of an artisan, aged 20, who, after having suffered in the year 1844, from repeated attacks of pain in the right iliac region, became seriously ill on the 1st of September, 1845.

His symptoms were acute pains in the ileo-cæcal region, always increased by pressure, meteorism, vomiting, and fever. Local abstractions of blood were resorted to without any benefit. The pain continued with slight remissions for four weeks. The bowels were confined, and were only kept open by the administration of the neutral salts.

On the 5th of October the skin was hot, dry, and yellowish; there was great emaciation and a red tongue. Pulse 120. The stools were watery; the abdomen was tympanitic; the liver was enlarged and tender upon pressure; and there was likewise tenderness in the region of the cæcum.

On the 8th of October the patient had a severe rigor, lasting for half-an-hour, and followed by heat and colliquative sweating. This attack was repeated on the 9th, 10th, 11th, and 12th of October, without any regular type, and was then checked by the use of Quinine and Morphia. Simultaneously with the rigor, jaundice made its appearance, and the liver increased rapidly in size. Several dark-green fluid stools were passed daily; the urine was scanty and deposited a sediment. From time to time there was vomiting of a pale-green fluid; and in the night-time there was delirium.

On the 31st of October, being the sixty-first day of the disease, or the twenty-third day after the first rigor, death ensued under symptoms of the last stage of hectic consumption.

Autopsy.

The liver was large, and contained several abscesses up to the size of an orange. The trunk and larger branches of the portal vein, but especially those pertaining to the right lobe of the liver, were filled with fibrinous coagula, undergoing suppuration in the centre; one branch of the portal vein contained fluid pus. The wall of the portal vein was thickened, infiltrated with serum, and softened. The spleen was large, and of a purple color; it contained at several places fibrinous deposits from the size of a lentil to a bean.

The extremity of the vermiform process was destroyed, and became lost in a collection of thick pus. No foreign body could be discovered.

The stomach and intestinal canal were normal.

The right kidney contained several deposits of pus.

The patient, who came under Buhl's observation, was 19 years of age, and after an error in diet, was suddenly seized on the 11th of October, 1853, with pains in the abdomen, rigors, vomiting, and diarrhœa. The pains ceased, but the rigors returned once on the 16th, and twice on the 17th. On the 11th a green fluid was ejected by vomiting. On the 20th the skin presented a yellowish color. On the 21st the left lobe of the liver was irregularly swollen and painful; the jaundice was increased. On the 26th the patient had two, and on the three following days five, attacks of rigors, which were followed only by sweating; there was repeated vomiting. The liver had increased in size. The stools were thin, and abounded in bile; the urine was scanty, and contained but little bile-pigment.

On the 2d of November the pains in the hepatic region had ceased, but the perspirations continued. Death, which was preceded by stupor and delirium, occurred on November 5th.

Autopsy.

The liver was about double the normal size. On the outer surface of the right, and more particularly on that of the left lobe, numerous prominent abscesses were observed, from the size of a hazel-nut to that of a hen's egg, and very many small rounded collections of pus were seen upon the cut surface. The appendix vermiformis of the cæcum was thickened, reddish-black, and filled with pus, and its extremity, which was perforated by a plug of fæces, led into an abscess the size of a hazel-nut, shut off by adhesions from the peritoneum. From this a sinuous fistulous passage passed between the folds of the mesentery to the trunk of the portal vein. The mesenteric veins which accompanied this fistula were filled with ichorous fluid and tubular plugs of fibrinous matter. The trunk of the portal vein was closed up by a plug of this sort. The lining membrane of this vein was greenish-yellow, and wrinkled. The hepatic branches of the vessel contained pus and coagula. The spleen was about double its normal size.

The rectum is much more rarely the starting-point of the disease. Borie (*La Clinique*, 2 Mai, 1829) met with a case in which a man, suffering from a recto-urethral fistula, was attacked with rigors and symptoms of acute inflammation of the rectum. The liver was found to be enlarged, and the portal vein was filled with a purulent white substance, which was firmly adherent to the coats of the vessel. Leudet observed the same accident follow an injury of the rectum from the canula of an enema syringe.

Still more rarely does the origin of the disease lie in the stomach. Bristowe (*Transactions of the Pathological Society of London*, Vol. IX., p. 279) has recorded a case of this nature, where purulent inflammation of the portal vein arose from a chronic ulcer of the stomach.

The patient was a laboring-man, aged 46, who had been addicted to drink, and who had suffered for a long time from pains in the stomach, vomiting, and constipation, and was in consequence emaciated. He was suddenly seized with acute pains in the abdomen, vomited up a substance resembling coffee-grounds, passed into a state of collapse, with cold extremities, and died.

A large ulcer, extending to the pancreas, was found in the stomach, the wall of which was thickened and covered externally with exudation. The principal branches of the portal vein were filled with coagula undergoing disintegration into pus. The upper portion of the jejunum, to the extent of a foot, was dark-red, and covered on its serous surface with soft yellowish lymph; the mucous membrane was covered by a layer of diphtheritic false membrane.

Bamberger makes mention of a similar case (*Krankheit. der Digestions-organe*, s. 285.)

c. *Suppuration of the Spleen.*

Under certain circumstances, abscesses of the spleen open into the splenic vein, and give rise to inflammation of this vessel, which is propagated to the portal vein. In one case I found several abscesses in the spleen, one of which had burst into the splenic vein, and given rise to suppurative pylephlebitis. The case is as follows:—

Observation No. XXVI.

Residence in a Marshy Country.—Fever of three weeks' duration, believed to be of a Typhoid nature.—Acute pains in both Hypochondria.—Embarrassed action of the Diaphragm, accompanied by a normal condition of the Lungs.—Profuse Perspirations.—Confined Bowels.—Repeated Rigors.—Very frequent Pulse.—Rapid Collapse.—Death.

Autopsy:—Numerous Adhesions of the Abdominal Organs.—Several large Abscesses in the Spleen.—Communication of these Abscesses with the Splenic Vein.—Wall of the Vein rough and covered with pus and masses of firm coagula as far as the Portal Vein.—Reddish-brown Coagula and Pus in the Hepatic branches of the Portal Vein.

Ferdinand Schneider, aged 37, was under treatment in All Saints' Hospital at Breslau from the 2d to the 13th of November, 1858. For six months he had worked as a prisoner at Koberwitz, where he became ill three months before admission, and was confined to bed for three weeks with what was believed to be an attack of abdominal typhus. It was impossible to form a decided opinion from the man's statements as to the nature of his illness at that time. After he had returned to his work for a short period, he was seized with violent pains in the upper part of the abdomen, which often prevented him from working, and generally from moving. At the same time the abdomen had become distended and the stools hard. On his release from prison he did not get rid of the pains; he was obliged for the most part to keep his bed, and he perspired so profusely that his landlady would not keep him any longer in the house, and he was obliged to go to the Hospital.

On admission, the patient was somewhat emaciated, moderately feverish, perspired much, and complained of pain in the epigastrium and right hypochondrium, which embarrassed his breathing. The epigastrium and right hypochondrium were tender upon pressure; the spleen and liver were enlarged; the abdomen was somewhat distended; the bowels were confined. The diaphragm was much elevated and scarcely descended at all upon inspiration, whilst the thorax was arched forwards to a great extent. The administration of Castor Oil was followed by slight relief, but the pains and immobility of the diaphragm, with a normal condition of both lungs, continued so obstinate that the diagnosis of a circumscribed peritonitis of the upper part of the abdomen was arrived at.

Although the patient certainly presented a gray and cachectic countenance, he was neither jaundiced at the time of admission, nor had he been so previously. His stools were of normal color; his urine contained neither albumen nor bile-pigment.

After some days, in consequence of the employment of local antiphlogistics, the pains were considerably relieved; the fever ceased; the appetite increased; the abdominal distention disappeared, and the respiration regained more of its normal character.

On the 10th, however, the pains and the fever, with the nocturnal perspiration, returned, while at the same time there was an increase of the distention of the abdomen, with distinct fluctuation, and the scrotum and lower extremities were somewhat œdematous. On the 11th the patient had a rigor, of half-an-hour's duration, which was followed on the 12th by two others, with profuse perspirations, but no jaundice. The pulse rose to 150, and the strength rapidly declined. The urine contained no albumen; the stools were of normal color, and there was no vomiting. On the 13th the patient died on attempting to turn upon his side.

Autopsy, 18 *hours after death.*

Cerebral membranes normal; brain somewhat pale and soft.

Bronchial tubes unobstructed; lungs rather firm, brownish-red, hyperæmic, everywhere crepitant, and posteriorly moderately œdematous. The diaphragm was elevated as high as the fourth rib; the lower lobe of the left lung was firmly attached to the walls of the chest by old adhesions. The heart was normal as regards its size, valves, and muscular tissue; the aorta was likewise normal.

The abdomen contained about six pounds of clear serum, and the organs in this region were at some places firmly adherent to one another, and likewise to the anterior abdominal parietes. The left lobe of the liver was adherent to the diaphragm, and a number of coils of intestine adhered to the abdominal wall; in several of the bands of adhesion were found the remains of inspissated cheesy-looking pus. The firmest adhesions were between the spleen and diaphragm, and on attempting to tear them, an abscess the size of a hen's-egg was laid open, the walls of which were formed externally by the layers of thickened tissue on the under surface of the diaphragm, and internally by the soft, pultaceous, light-brown parenchyma of the spleen. In addition to this large abscess, several smaller ones were found in the spleen, which was enlarged. The splenic vein was filled with a purulent coagulum; one branch of the vessel led directly into the large abscess; the walls of this branch were rough, discolored and thickened; the coagulum was prolonged in the form of a rounded, striated cone, as far as the trunk of the portal vein; the mesenteric vein was unaffected.

The liver was enlarged, firm, grayish-brown, and of a somewhat lardaceous lustre; on its outer surface, and still more upon section, white ramifications of vessels were observed, from the openings of which purulent coagula, partly firm, reddish-brown and sausage-shaped, and partly diffluent, could be pressed out. These vessels belonged to the portal vein. The adjoining parenchyma was in no way diseased; the hepatic veins were unaltered. The gall-bladder contained apparently normal bile.

Mucus, tinged with bile, was found in the stomach. The intestinal canal was distended, and, at the parts which were adherent, presented a slaty-gray color pervading all the coats, and here and there dilated small veins; but in other respects its mucous membrane was normal, and nowhere exhibited any traces of a previous attack of abdominal typhus. The color of the fæces was normal.

The bladder and kidneys were pale.

To this observation may be added the case observed by Law (*Dublin Quarterly Journal,* February, 1851, p. 238) of inflammation of the splenic vein with thrombosis and suppuration, in consequence of a gangrenous abscess of the spleen. Waller also has published an observation, where pleurisy on the left side was followed by perisplenitis, which spread to the splenic vein.

d. *Suppuration in the Mesentery and Mesenteric Glands.*

There are several cases on record of pylephlebitis associated with suppuration in the mesentery and mesenteric glands. In some of them the inflammation of the portal vein was the result of the morbid processes in the mesentery, but in others the abscesses between the layers of the mesentery appeared to proceed from the phlebitis.

Busk (*Budd, Diseases of the Liver,* p. 173) describes a case in which the portal vein, immediately after the junction of the splenic and mesenteric veins, was extensively ulcerated, and what remained of its inner surface was covered by a buff-colored false membrane. The tissue in which this part of the vein was lodged was indurated and black; and immediately in contact with the vein were large and suppurated mesenteric glands. The whole mesentery was much thickened and the glands much enlarged, and in a state of suppuration. Pus could be pressed out in great quantity from the dilated portal vein, and was also deposited in the surrounding areolar tissue. Both lungs contained numerous large and small abscesses. The spleen was not enlarged. The peritoneum was inflamed.

The patient, a robust man, had been seized seven weeks before death, with severe pains in the abdomen, which were not increased by pressure. Soon afterwards he had repeated attacks of rigors, followed by profuse perspiration. Subsequently he became jaundiced, and the urine contained bile. After a few days the jaundice suddenly disappeared, and the evacuations became of natural color and consistence, the change in their characters being preceded by a copious discharge of nearly pure bile. The patient never vomited. He gradually sank, becoming much emaciated.

Hillairet also (*L'Union Médicale,* 1849, p. 261) found suppuration of the mesenteric glands coexisting with thrombi in the portal vein, which in the trunk of the vessel were firm, but in its branches were purulent. The patient was a clerk, 29 years of age; the symptoms of the disease during life had been frequent rigors, followed by heat and sweating, acute pains in the epigastrium and right hypochondrium, constipation, vomiting, meteorism, &c.

Virchow (*Gesammelte Abhandl.*, s. 572) observed varicose enlargement of the mesenteric vein, with firm and softened thrombi, accompanying metastatic hepatitis. The varicose enlargements appeared to be connected with a partial chronic peritonitis, consequent upon an old scrotal hernia.

In the case recorded by Leudet (*Archiv. de Méd.*, Févr., 1853), pus was likewise found between the folds of the mesentery, which surrounded the rigid gaping walls of the vein. The trunk and hepatic branches of the portal vein contained pus. The spleen and splenic vein were normal.

It is not always possible to determine with certainty, whether the phlebitis is to be regarded as the cause of the abscesses in the surrounding connective tissue, or whether the relation of the two lesions ought to be reversed. The opinion that the lesions do also bear the latter relation to one another is favored by the case recorded by Cruveilhier (*Anat. Pathol.*, Livr. XVI., Pl. III.), where the sheath of the portal vein was infiltrated with pus, down as far as the meso-colon and meso-rectum, without the vessel itself or its contents exhibiting any deviation from the normal state. The connection between phlebitis and suppurating mesenteric glands, which open into the adjoining veins, or from which the inflammation spreads to the coats of the veins, is more obvious.

e. *Abscesses of the Liver and Diseases of the Bile-ducts.—Gall-stones.*

It has already been stated (Vol. II., p. 127), that suppurative hepatitis causes inflammation of the branches of the portal vein much more rarely than of the hepatic veins.

A far more frequent cause of the generation of pylephlebitis is inflammatory irritation of the bile-ducts, especially when this depends upon gall-stones, which may lead to ulceration and perforation, not only of the wall of the bile-ducts, but likewise of the vein.

An instructive example of this nature has been recorded by Dance (*Archiv. de Méd.*, Dec., 1828, Jan. and Févr., 1829).

In this case the ductus choledochus was converted into a tortuous cavity, which contained membranous shreds, saturated with bile; posteriorly, there were several deep ulcers, some of which extended to the walls of the adjoining veins and penetrated into their cavity. One of these ulcers communicated by an opening, one line in diameter, with the superior mesenteric vein, and from this the inflammation was propagated to the hepatic branches and downwards to the splenic and pancreatic veins, &c. Secondary suppuration had also taken place in the temporal vein, the parotid, the deltoid muscle, the elbow-joints, and shoulder-joints.

Budd (*Diseases of the Liver*, p. 176) describes a case of pylephlebitis, induced by gall-stones, which was remarkable for the very long duration of its progress.

Lebert (*Anat. Pathol.*, Vol. II.) mentions another, which terminated fatally on the thirty-fourth day of the disease.

The case was that of a weakly female, aged 20, who worked at a factory. At first the predominant symptoms were of a typhoid character:—violent fever, pains in the head, great debility and diarrhœa. On the ninth day the patient had an attack of rigors, and soon afterwards complained of pains in the right hypochondrium with swelling of the liver. The diarrhœa persisted; slight jaundice; fresh attacks of rigors; rapid emaciation; somnolence and death.

The liver was greatly enlarged and studded with abscesses. There was suppurative inflammation of the portal vein; its lining membrane was partly destroyed and covered with yellow false membranes. The bile-ducts were greatly distended and contained numerous concretions; their coats were ulcerated and covered with pus.

f. *Inflammation of Glisson's Capsule.*

In many cases of pylephlebitis, accumulations of pus are found in Glisson's capsule, where this envelopes the portal vein at its entrance into the liver. In some cases these deposits have been inconsiderable, and might be regarded as resulting from the phlebitis, but in other cases, abscesses have presented themselves in this locality, whose size and anatomical characters indicated that the phlebitis resulted from them.

To the latter class belongs, in the first place, the observation of Schönlein (*Klinische Vorträge von Güterbock*, Berlin, 1842, s. 275, and likewise the *Memoirs of Kaether, Sander and Messow*).

The patient was a sadler, aged 26, of a healthy, strong constitution, who, without any cause, was seized with violent pains in the region of the linea alba, between the umbilicus and ensiform cartilage. The abdomen was soft and tender upon pressure; tongue yellow; violent fever. The diagnosis arrived at was perienteritis. The treatment consisted in abstractions of blood, both general and local, cataplasms, warm baths, and Aqua Laurocerasi. The fever abated. On the third day the patient had a severe rigor, which was repeated at uncertain intervals, and recurred three times in one day. The urine was dark-brown; the skin was yellowish; and the stools brownish-black. The opinion was now formed that there was inflammation of the portal vein. Calomel internally, and frictions with Mercurial Ointment were prescribed. Salivation was induced. The fever assumed a hectic character; the rigors became less frequent, only recurring at intervals of several days; rapid emaciation; greenish color of the skin. Muriate of Quinine was prescribed. In the seventh week the abdomen became distended and tender, and there was vomiting of green, and ultimately of fœtid matter. The spleen and liver became enlarged; delirium supervened, and death occurred at the end of two months.

At the autopsy there was discovered slight injection of the peritoneal covering of the transverse colon, behind which a portion of the small intestine, exactly in the middle line, between the umbilicus and ensiform cartilage (where the pain had existed during life), was firmly adherent to the meso-colon, and on separating them an abscess was discovered, filled with thick pus, and surrounded by hard callous margins. From this abscess a short sinus led to the portal vein, the trunk of which was remarkably distended and filled with dark-yellow jaundiced pus. The ramifications of the vein likewise contained pus. The lining membrane of the vein appeared thickened and velvet-like; there was nothing abnormal in the hepatic parenchyma; the spleen was about double its normal size. The heart and lungs were normal.

There was a similar relation between inflammation of Glisson's capsule and suppurative pylephlebitis in the cases recorded by Von Niess (*Heid-*

elberger Annal., Bd. XII., s. 3), and by Langwaagen (*De Venæ Port. Inflammatione. Diss. Inaug.* Lipsiæ, 1855, p. 40).

In addition to the forms of pylephlebitis already mentioned, the mode of origin of which is more or less obvious, there are others where no certain starting-point can be discovered as the cause of the disease.

To this class belong the observations of Balling (*Zur Venen-entzündung,* Wurzburg, 1829, s 310), of Reuter (*Ueber die Entzündung der Pfortader*, Nürnberg, 1851), and others. In these cases, a chill (Balling), the use of tea, coffee, spices, and drastic purgatives (Fauconneau-Dufresne) and spirits (Baczynski) have respectively been blamed as the exciting causes of the disease; but statements of this sort are devoid of any firm foundation, and are opposed by the great rarity of the disease, notwithstanding that the reputed injurious agencies are daily encountered by thousands.

3. *Symptomatology of Suppurative Pylephlebitis.*

The clinical history of suppurative pylephlebitis varies according to its mode of origin. The appearance of the symptoms of phlebitis is usually preceded for a longer or shorter period, by the symptoms of the morbid processes which induce it, such as perityphlitis, ulceration of the stomach or intestinal canal, inflammation of the spleen, chronic peritonitis, gall-stones, &c.; more rarely there are no premonitory symptoms, owing to the primary disease remaining latent.

The commencement of inflammation of the portal vein is announced by pains which are located in the epigastrium, the right or left hypochondrium, the cæcal or umbilical region, according as the trunk, or one of the branches, or one of the roots, of the vein are first diseased. Soon afterwards the patient has a rigor, followed by heat and profuse sweating; this series of symptoms recurring more or less frequently, without any certain type. At the same time, the liver and spleen, as a rule, increase in size, and are tender upon pressure; the skin and urine become jaundiced; whilst the stools are copious, thin, and bilious, although in exceptional cases there is constipation. Subsequently, the symptoms of diffuse peritonitis, painful distention of the abdomen, vomiting, &c., usually supervene; the patients rapidly lose flesh and strength; the suppurative fever assumes a hectic character, and ultimately delirium or somnolence is developed and terminates in death. In some cases death is preceded by the symptoms of metastatic deposits of pus in the lungs, the joints, &c.; and in exceptional cases dilatations of the abdominal veins, in consequence of the obstructed portal circulation, are likewise observed.

This series of symptoms may commence and run its course in the space of one or two weeks (Baczynski, Mohr, and Frey): but in most cases the process lasts from four to six weeks before the fatal termination (Ormerod, Busk, Marotte, Lambron, Niess, Langwaagen, Leudet, Lebert, &c.), or two months (Waller), and in exceptional cases, even longer (Budd).

In cases where the morbid process is prolonged, deceitful remissions sometimes take place, until a fresh attack of rigors announces the continuance of the disease to a fatal termination.

4. *Origin, Frequency, and Diagnostic Value of Individual Symptoms.*

a. *The Pain.*

Pain is usually the first symptom of the disease, and is in no case completely absent. In most cases, it has its seat in the epigastrium and right hypochondrium, but presents nothing peculiar, either in its nature, or in the mode of its radiation.[1] Not unfrequently the pain proceeds from the cæcal or umbilical region, and occasionally also from the spleen. At a subsequent period, after the supervention of peritonitis, the pain extends over the entire abdomen. The abdomen at first may be but slightly distended and tender upon pressure, the symptoms not undergoing an increase until the supervention of peritonitis, and then varying in intensity according to the acuteness of the inflammation.

b. *The Liver.*

The liver is enlarged in the majority (about three-fourths) of the cases, on account of the development of abscesses in its interior, and at the same time the organ becomes tender, as in other forms of hepatitis. In cases where no abscesses are developed the volume of the gland remains unaltered. In one-fourth of the recorded cases no enlargement of the organ was perceived.

c. *The Spleen.*

The characters of the spleen resemble those of the liver. Out of 19 cases it was enlarged 14 times, and 5 times its size was normal; in the remaining 2 cases no mention was made of it.

Not unfrequently, the tumefaction of the spleen is developed suddenly, and then it attracts attention by the existence of pain in the left side. The presence or absence of tumefaction of the spleen depends mainly on whether the splenic vein is occluded at an early period, or remains pervious; it is also influenced by other circumstances, such as changes in the composition of the blood, and the condition of the capsule and parenchyma of the spleen, by which enlargement is sometimes permitted, and at other times prevented; lastly, the obstruction to circulation may be compensated for by the escape of blood into the intestinal canal, and in this way the absence of enlargement of the spleen may be accounted for.

d. *Jaundice.*

Jaundice is usually developed in a more or less marked degree during the course of suppurative pylephlebitis. The skin assumes a pale or deep-yellow, or occasionally, a greenish tint, while the urine becomes colored in like manner, although, sometimes, only a small quantity of pigment can be discovered in it (Lambron, Buhl). In some cases petechiæ are developed upon the skin at the same time (Dance, Waller, &c.).

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[1] Great stress, for the purpose of diagnosis, has unjustly been placed upon the seat of the pain in the linea alba, between the ensiform cartilage and the umbilicus, and upon its burning character.

Jaundice is, however, by no means a constant accompaniment of suppurative pylephlebitis. It has been entirely absent in one-fourth of the recorded observations, and in some cases even where the liver contained metastatic deposits of pus (Frey).

The origin of jaundice in this disease is accounted for by what is stated in Vol. II., p. 141, and by the remarks made in the first volume upon the subject of jaundice in general.

e. *The Functions of the Stomach and Intestinal Canal.*

The functions of the stomach and intestinal canal are always impaired in a conspicuous manner. More than two-thirds of the patients have had diarrhœa, the stools being of a bilious character, and occasionally containing traces of blood, or fibrinous flakes of dysenteric exudation; in a smaller proportion of cases the bowels have been confined. In those cases where occlusion of the bile-ducts by concretions was the primary cause of the phlebitis, the stools presented the appearances usual under such circumstances.

The derangements of the stomach are less remarkable; usually, they only manifest themselves in the form of intense catarrh. Greenish vomiting occurred only 5 times out of 21 cases, and in some of these cases it arose from consecutive peritonitis. The repeated eruption of aphthæ, noticed by Mohr, and the exudative stomatitis, observed by Waller, cannot be connected in any way with the affection of the portal vein.

f. *The Fever and other General Derangements.*

As in other forms of phlebitis, the formation of pus in the portal vein is indicated by an attack of rigors, which, in most cases, is followed by serious symptoms. The rigors return from time to time, and may assume such a regular type as to lead to the assumption of the existence of intermittent fever. In the majority of the recorded cases, however, they were unaffected by quinine.

In most cases the attacks of rigors soon become irregular, returning several times in the course of the day, or ceasing for a long time, and then recurring more frequently and with greater severity.

The rigor is usually followed by heat and a profuse, clammy, exhausting sweat; in exceptional cases, however, there is no hot stage (Lambron, Langwaagen). At a more advanced period the fever sometimes assumes a hectic character.

The pulse varies in frequency from 90 to 130, and the temperature, according to Langwaagen, from 28°8 to 32°3 R (*i.e.*, from 96°8 to 104°6 Fahr.): the exacerbation occurred sometimes in the morning and sometimes in the evening; the temperature during the rigor was 31°2 R (102°2 Fahr.).

Along with this fever a very rapid loss of flesh and strength is observed at an early period. The patients in a short space of time become remarkably emaciated, pale, cachectic, and weak.

Moreover, in most of the recorded cases, there were developed typhoid derangements of the nervous functions—delirium, somnolence, &c., similar to what are observed in pyæmia, and other forms of phlebitis. It is only in a few exceptional cases that the consciousness remained unimpaired until death (Mohr, Frey). It is remarkable that, notwithstanding this frequent occurrence of symptoms of blood-poisoning, the formation of metastatic deposits in distant parts of the body so rarely takes place. Out of 25 cases, such deposits were only met with 4 times. This is apparently due to the circumstance of the portions of thrombus which are propelled into the circulation, being arrested in the capillaries of the liver, and not reaching the general circulation.

5. *Diagnosis.*

The detection of pylephlebitis is only possible in those cases where the characteristic group of symptoms is completely developed, and the origin of the morbid process has been carefully traced.

At the commencement of the disease, and not unfrequently at a still later period, the symptoms are far from admitting of a positive diagnosis; at the most, they only suffice to render a disease of the portal vein probable. There are no definite symptoms, such as the seat, or the nature of the pain, upon which the assumption of the existence of pylephlebitis can be based (as some observers have thought); the concurrence of a definite series of symptoms, and the manner in which they are developed constitute our only guide. The most important data for diagnosis are the following:—Pains in the epigastrium above the umbilicus, or in the right hypochondrium, or in any of the other localities in which the inflammation has been shown to originate; attacks of rigors, recurring at irregular intervals, and followed by profuse sweats; painful enlargement of the liver and spleen, accompanied by jaundice, bilious diarrhœa, and rapid emaciation; and, lastly, the typhoid symptoms of blood-poisoning, and the symptoms of general peritonitis. In addition to the above, there are the premonitory symptoms of perityphlitis, inflammation of the spleen, ulceration of the intestines, gall-stones, or of the other affections, by which the disease of the portal vein is induced.

Suppurative pylephlebitis may be confounded with:—

a. *Thrombosis of the Portal Vein.*

In the case of thrombosis of the portal vein, the violent fever with typhoid symptoms is wanting, and in place of peritonitis we find ascites, which increases rapidly to a remarkable extent.

Again, in the suppurative form of phlebitis, the liver is usually enlarged; but in the adhesive form, on the other hand, its size is reduced; in the former, jaundice is, in most cases, present; but in the latter its occurrence is exceptional. Enlargement of the subcutaneous veins of the abdomen is the rule in thrombosis, but is scarcely ever observed in suppurative inflammation. Moreover, the predisposing morbid processes are different in the two cases; obstruction of the portal vein is preceded by chronic atrophy, cirrhosis, or cancer of the liver, chronic peritonitis, &c.; whereas suppurative inflammation of the portal vein is preceded by perityphlitis, splenitis, gall-stones, &c.

b. *Abscesses of the Liver.*

The causes of abscesses of the liver are different from those of suppurative perityphlitis; their most common cause in temperate climates is a contusion of the right hypochondrium; the pain is limited to the liver; pyæmic infection rarely ensues; enlargement of the spleen, diarrhœa, and other symptoms of obstruction of the portal vein are wanting.

c. *Occlusion of the Bile-ducts by means of Concretions.*

It is true that this affection is characterized by Jaundice, enlargement and tenderness of the liver, and irregular attacks of rigors, in the same way as suppurative inflammation of the portal vein; but diarrhœa, enlargement of the spleen, and the symptoms of obstruction of the portal circulation and of pyæmia, are wanting.

d. *Intermittent Fever.*

Attacks of rigors and tumefaction of the spleen are common to both intermittent fever and suppurative inflammation of the portal vein; but the jaundice, the painful enlargement of the spleen, the symptoms of obstruction to the circulation, and of rapid loss of strength, and lastly, the inutility of quinine, characteristic of the latter disease, prevent their being confounded.

6. *Prognosis.*

The prognosis in the disease under consideration, does not allow of any expectation of a favorable result. The disease always terminates in death. Recovery is only possible when the disease is limited to single branches of the portal vein.

7. *Treatment.*

Treatment is powerless against suppurative inflammation of the portal vein. The most it can do is to relieve the troublesome symptoms; it exerts no certain influence over the progress of the disease itself. Considering its deep situation, we can scarcely ever hope to arrest the inflammation of the vein by means of local or general blood-letting, and therefore we ought not to exhaust the patient's strength by such measures. Antiphlogistics are equally powerless in preventing the formation of metastatic deposits in the liver. Little else remains to be done than to employ quinine for the rigors, and opiates for the diarrhœa and pain; to prevent the loss of strength by a mild, nutritious diet; and to combat the distressing symptoms, so far as therapeutics furnishes us with the means.

III.—DISEASES OF THE HEPATIC VEINS.

We have already (Vol. II., p. 34) become acquainted with the dilatation which the hepatic veins undergo as far as their capillary roots, in diseases of the heart, and especially in constriction of the left auriculo-ventricular opening, as well as in incompetence of the mitral and tricuspid valves. This dilatation not unfrequently attains such a degree, that the glandular cells in the centre of the lobules disappear from the pressure of the distended capillaries, and a granular atrophy is observed in the liver, which is very frequently mistaken for cirrhosis. The enlargement of the hepatic veins results from the backward pressure of the venous blood, and is the ordinary appearance presented by the liver after death from valvular diseases of the heart.

Adhesive and suppurative inflammation are likewise observed in the hepatic veins.

A. ADHESIVE INFLAMMATION OF THE HEPATIC VEINS.

Phlebitis Hepatica Adhæsiva.

This is on the whole a rare form of inflammation, and in most cases results from inflammation of the capsule of the liver, and the serous covering of the diaphragm at the posterior margin of the liver, which is propagated to the coats of the vein. The wall of the vein becomes thickened, whilst gelatinous deposits, or occasionally valvular projections, narrowing the channel of the vessel,[1] or sometimes completely obliterating several of its branches, are developed upon its inner surface. This condition is attended by similar symptoms of obstruction to those which result from occlusion of the portal vein, with the addition of extravasations of blood into the substance of the hepatic tissue. These changes in the hepatic parenchyma are carefully described in Vol. II., Observation No. XXXVII., p. 124. Thrombi are likewise developed in the portal vein, in consequence of the obstructed circulation.

The following case will elucidate still further the statements which have just been made.

OBSERVATION No. XXVII.

Painful Distention of the Abdomen by a rapid effusion of fluid in a person who was a habitual drinker.—Elevation of the Diaphragm.—Dyspnœa.—Bilious Diarrhœa.—Jaundice.—Tumefaction of the Spleen.—Paracentesis.—Rapid return of the Ascites.—Exhaustion.—Delirium.—Death.

Autopsy:—Dense Adhesions of the Liver to the surrounding parts.—Recent Thrombi in the roots and branches of the Portal Vein.—Thickening of the walls of the Hepatic Veins, with roughness of their lining membrane.—Obliteration of several branches of the Hepatic Vein, and old Coagula in their interior.—Cartilaginous deposits upon the inner surface of the Vena Cava.—Tumefaction of the Spleen.—Ecchymoses of the serous membrane of the Intestines.

Gottlieb Emmerich, laborer, aged 45, was under treatment from the 19th to the 29th of July, 1858.

The patient, who, according to his wife's statement, had for some years been in the habit of drinking a large quantity of brandy, was able to work until eight days before admission, and, prior to that time, had only complained of temporary sensations of fulness in the præcordial region. During the space of one week a painless enlargement of the abdomen had been rapidly developing itself, in conjunction with jaundice. These symptoms induced him to seek admission into the Hospital, to which he came walking, being still active.

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[1] See Vol. II., Observation No. XXXVII.

His complaints were mainly referrible to dyspnœa, arising from very extensive ascites. There was no œdema of the feet; the countenance and hands were cyanotic; the sclerotics were tinged yellow; bile-pigment was found in the urine, which was passed in very sparing quantity—scarcely three ounces in 24 hours. The appetite had not entirely ceased; there was no vomiting; the stools were semi-fluid and dark-brown.

The right side of the thorax was somewhat flattened in front, and at its base expanded less freely than the left; nothing abnormal, however, could be discovered on auscultation or percussion.

The hepatic dulness commenced at the fourth rib; it was not depressed on inspiration; its perpendicular diameter was somewhat reduced, both in the mammary line (8 centimètres, or 3·15 Eng. inches) and in the epigastrium (5 centimètres, 1·97 Eng. inch). The impulse of the heart was observed in the fourth left intercostal space; the diaphragm was thus elevated on both sides, but still it acted normally on inspiration. The cutaneous veins in the epigastrium and right hypochondrium were moderately dilated; further down, below the umbilicus, there was nothing abnormal. The spleen was enlarged to a moderate extent.

The ascites was very considerable; the abdomen was tensely distended by the fluid, and, except in the umbilical region, yielded everywhere a dull sound on percussion. There was only a moderate degree of pain at the epigastrium.

On the 22d of July, about 20 pounds of fluid were drawn off by paracentesis. This fluid was opaque from the presence of fibrinous flakes; after long standing, a small quantity of fibrin, and subsequently coagulum, separated from it; it contained both bile-pigment and sugar; it was tested for glycogen (*glycogene Substanz*), leucine, and the biliary acids, without any result. It contained 2·48 per cent. of solid matter, including 1·64 per cent. of albumen and 0·20 per cent. of sugar. Immediately after the paracentesis a slight relief was experienced, but towards evening the abdomen again became distended almost to its former extent. As a result of the exhaustion, the patient had frequent attacks of fainting; the feet and hands were cool and livid, but not œdematous. The jaundice had increased; several semi-fluid brown stools were passed, without any admixture of blood.

On the 23d, pulse 120, scarcely perceptible; tendency to somnolence; no change in other respects.

On the 24th, had been delirious during the night; the jaundice increased; only 2½ ounces of urine had been voided in twenty-four hours; in other respects the symptoms were the same as before.

On the 25th, the dyspnœa was more urgent than ever it had been before, in consequence of which the patient had slept but little during the previous night. The urine was very scanty, but retained its former characters. The extremities were cool and the feet livid.

On the 26th, pulse 116; respirations 28; great restlessness and occasional attacks of hiccup. Since the previous evening had been very delirious, and passed his motions involuntarily.

On the 27th, pulse 108, and could only be counted over the heart. During the night the patient attempted to leave his bed. The feet began to be œdematous.

On the 28th, during the night was more restless, and the evacuations were passed involuntarily. The patient lay in an apathetic state, and muttered to himself, but replied to questions which were put to him. His countenance was a little less yellow than formerly. The urine drawn off by catheter was scanty, and had a specific gravity of 1022; it contained but a small quantity of urea or chlorides, but much bile-pigment.

On the 29th, pulse 120, and could not be felt at the wrist; respirations labored, and very superficial (*oberflächlich*). On the right side of the chest in front, there was dulness extending as high as the second rib, the upper margin of the dull space appearing to be depressed on inspiration; on the left side, the dulness commenced in the third intercostal space, and was continuous with that resulting from the ascites. The patient was completely unconscious; the œdema had extended as high as the inguinal region; no stool was passed; the urine was the same as on the 28th. After a few hours of deep stupor, death occurred at 2 o'clock in the afternoon.

Autopsy, 18 *hours after death.*

Skull-cap and dura mater congested. Lying on the inner surface of the dura mater was a red extravasation, about one line in thickness. The longitudinal sinus contained firmly-coagulated blood. The vessels of the pia mater were somewhat congested, as was likewise the brain-substance, the whole of which appeared in other respects normal.

About six ounces of clear fluid were found in the right pleural cavity, and a smaller quantity in the left.

The mucous membrane of the pharynx was of a slaty-gray color; that of the œsophagus was pale; the thoracic aorta was slightly atheromatous.

The mucous membrane of the larynx was of a dark-red color, and there were ecchymoses at some parts of the trachea. The right lung was adherent at its upper part, and was throughout much congested; the lower lobe was in a state of splenization.

There were two large aponeurotic patches (*Sehnenflecken*) on the epicardium of the right side of the heart; the margin of the mitral valves was moderately thickened, but in other respects the characters presented by the heart were normal.

The abdominal cavity contained about 18 pounds of yellow fluid, which was less turbid than that which was drawn off by paracentesis: it was also poorer in solid constituents, and particularly in albumen, containing only 2·01 per cent. of solid matter, with 0·90 per cent. of albumen; it no longer contained any sugar.

The spleen was glistening, dense and firm, but it neither yielded an amyloid reaction nor presented a sago-grain structure.

The liver was likewise dense and firm; its outer surface was finely-granular; its margins were sharp; its form was globular, and its volume was somewhat reduced. The bile was dark and viscid.

Thick coriaceous masses of connective tissue were found on the under surface of the liver, which, on the one hand, extended towards the vertebral column, connected the rounded margin of the gland firmly to the diaphragm, and spread over the pancreas, and, on the other hand, penetrated with Glisson's capsule deep into the glandular tissue. The hepatic parenchyma was finely-granular, presented a nutmeg appearance, and here and there was colored yellow from stoppage of the bile.

The mucous membrane of the larger bile-ducts was softened; the gall-bladder was filled with dark bile; the ductus choledochus was pervious.

All of the hepatic branches of the portal vein were filled with reddish-black coagula, which could everywhere be separated with ease from the smooth, intact wall of the vessel.

On tracing the hepatic veins from the posterior margin of the liver, the first thing observed was rounded plates (*Placques*) upon the inner surface of the vena cava, nearly the size of a lentil, and resembling the atheromatous plates seen in arteries. At one place the wall of the vein was drawn together by two bridge-shaped bands of connective tissue. The hepatic veins opening into the vena cava were altered in a remarkable manner. One of them was completely closed up by a pale-red round nodule, the size of a cherry-stone; another terminated in a blind extremity; its wall was much thickened, and internally it was covered by numerous plates; a third was much constricted, at its entrance into the vena cava, by the surrounding masses of connective tissue, while its inner wall was rough, and presented firmly-adherent deposits, partly grayish-yellow and partly brownish-black, together with recent coagulum; the smaller branches were filled up with these substances.

The thrombi of the portal vein extended not only to the branches of the vessel in the interior of the liver, but likewise to the roots of the vessel—the splenic and mesenteric veins; the veins of the stomach alone remained exempt.

The deposits of connective tissue at the posterior margin of the liver extended far over the muscular tissue of the diaphragm, and was particularly abundant in the neighborhood of the cardia and œsophagus.

The stomach was faintly injected; its mucous membrane was nowhere ulcerated; the submucous tissue at the cardia was found to be considerably thickened, and the mucous membrane at this part was puckered by an extensive radiated cicatrix. The mesenteric vessels were very hyperæmic; a series of ecchymoses, half-an-inch broad, was found in the adipose areolar tissue of the mesentery along the margin of the small intestine, from its upper extremity down as far as the ileum; the mucous membrane of this portion of the bowel was moderately injected and covered with bloody mucus; the mucous membrane of the ileum presented ecchymoses at some places, particularly in the folds; the cæcum contained thin yellow fæces.

The kidneys were normal, and their vessels were empty. The bladder was somewhat injected and ecchymosed. The prostate was sound.

The crural veins were quite free from disease.

The diagnosis between obliteration of the hepatic veins and obstruction of the portal vein is impossible. The treatment must be regulated by the same principles as in adhesive pylephlebitis.

B. SUPPURATIVE INFLAMMATION OF THE HEPATIC VEINS.

(*Phlebitis Hepatica Suppurativa.*)

Suppurative phlebitis of the hepatic veins is much more common than the adhesive form, and is usually the result of hepatic abscesses. It is met with as a very frequent accompaniment of metastatic deposits in the liver.

The walls of the hepatic veins are implicated by deposits of pus, which come in contact with them; their lining membrane becomes rough, and covered with fibrinous deposits, which soon disintegrate, and are converted into a puriform material.

The hepatic veins are much more liable to these morbid changes than the portal vein, because they are devoid of any sheath, whilst the portal vein is isolated by Glisson's capsule from the surrounding parenchyma. Purulent phlebitis of the hepatic veins leads more readily than inflammation of the portal vein, to poisoning of the blood and the formation of metastatic deposits, because its products are carried with the circulation to the heart, and from thence are distributed to distant parts of the body.

There is no peculiar treatment for this form of phlebitis.

The following case, which is only one out of a large number of observations, is given by way of illustration of the remarks just made.

OBSERVATION No. XXVIII.

Severe Wound of the Head from a Fall.—Delirium Tremens.—Gangrene of the Wound.—Repeated attacks of Rigors.—Tumefaction of the Spleen.—Jaundice.—Death.

Autopsy:—Fracture of the Occipital Bone.—Suppuration of the Diploë.—Softened Thrombus in the Sinus transversus.—Metastatic Deposits in the Right Lung.—Bloody exudation in the Pleura.—Abscesses of the Liver.—Phlebitis Hepatica Suppurativa.

Fr. Reczinsky, aged 58, a laborer, was under treatment in All Saints' Hospital, at Breslau, from May 31st to July 21st. On the 30th of May this man, when drunk, fell down a flight of steps, and remained for two days without any treatment. A wound, with gangrenous walls, was found in the neighborhood of the lambdoidal suture, and extending over both parietal bones, but there was no obvious injury of the bones. Cold external applications and Sulphate of Soda were prescribed.

On the following day there was delirium tremens, which lasted till the 4th of June, and yielded to the use of opiates. During his delirium the patient repeatedly tore off the dressings; the gangrene extended greatly, and the bone became bare and rough. Dressing with chlorine water was ordered.

On the 5th of June there was a fresh exacerbation of the symptoms; the pupils acted slowly; vomiting and constipation; pulse 110; repeated rigors; tumefaction of the spleen. Calomel, and afterwards Quinine, were prescribed.

On the 16th the febrile symptoms ceased; the patient's consciousness was unimpaired; and the wound was granulating.

On the 17th and following day there were fresh attacks of rigors, followed by profuse sweating, somnolence, increase of the splenic tumor, vomiting, collapse, and jaundiced color of skin. Death took place on the 21st.

Autopsy, 10 *hours after death.*

A fracture was found in the occipital bone, two inches long, and extending into the jugular foramen; the diploë was discolored and infiltrated with pus: the dura mater was separated from the bone, over a space the size of a thaler (1¼ Eng. inch in diameter), by a deposit of pus, which extended into the transverse sinus. The latter contained a softened coagulum, which was prolonged downwards through the jugular foramen. The cortical substance of the posterior lobe of the brain was, at some places, softened and discolored.

Two pounds of turbid bloody fluid were found in the right pleural cavity. The upper lobe of the right lung contained a deposit of pus, nearly the size of a hazel-nut, the margins of which were brown. The lower lobe contained a brown infarction, 2 inches long, and 1½ inch broad, including only a few isolated points of pus, which were formed by branches of the pulmonary artery, filled with purulent thrombi. There was no change of importance in the heart.

The spleen was large and soft.

The liver was enlarged and in a state of fatty degeneration. Numerous patches of a dirty-yellow color, and varying in size from a lentil to a cherry, were found on its cut surface; the lobular structure of the hepatic parenchyma was still distinguishable in these patches, in the form of yellow dots, surrounded by a dark rim. Some of the adjoining branches of the hepatic veins were filled with disintegrating purulent coagula; while, in others the venous wall was diseased on one side only. In the latter case the abscess could be seen through the inner membrane of the vein, which was here rough and covered with fibrinous deposits, and partly torn up into shreds. The branches of the portal vein were normal.

In the ileum the solitary glands and Peyer's patches were enlarged; the mucous membrane of the stomach and intestinal canal was in other respects normal.

CHAPTER III.

Diseases of the Biliary Passages.

The excretory ducts of the liver, from their commencement in the glandular parenchyma to their termination in the intestinal canal, are as liable to become diseased as the secreting substance of the organ. The morbid conditions of the ducts may induce numerous derangements, partly from causing retention of the bile, and partly from involving the surrounding hepatic tissue.

These diseases sometimes commence in the intestinal mucous membrane, with which the lining membrane of the bile-ducts is continuous, while at other times they originate in the hepatic parenchyma. They are also frequently referrible to foreign bodies, such as concretions, entozoa, &c., which are met with in this locality, or to causes of a general nature, which are less known, such as atmospheric influences, marsh miasmata, and changes in the composition of the blood, resulting from typhus and allied processes.

Diseases of the biliary passages have not yet been sufficiently studied, from the circumstance that there are obstacles to their investigation which it is difficult to surmount. Among these obstacles may be mentioned our imperfect knowledge of the mode of commencement of the ducts, their small size, and the rare opportunities of examining affections of this nature in their recent state, &c.

I.—INFLAMMATION OF THE BILIARY PASSAGES.

Inflammation of the biliary passages may present itself in different forms.

A. As catarrhal inflammation, accompanied by an increased secretion of mucus.

B. As exudative inflammation, which forms at one time an albuminous purulent, at another a firm fibrinous, and at another a diphtheritic exudation, leading to ulceration.

A. CATARRH OF THE BILIARY PASSAGES.

1. *Anatomical Description.*

Catarrh of the biliary passages manifests itself by similar changes to those observed in catarrhal conditions of other mucous membranes. One rarely has the opportunity, however, of tracing the process in its earliest stages; in most cases, by the time the liver comes to be examined, the injected appearance of the mucous membrane has disappeared, and the membrane is found to be pale or livid, softened, tumid, and covered with a tenacious, vitreous, or grayish-yellow, purulent secretion; firm plugs of mucus are particularly common in the duodenal opening of the ductus choledochus.[1] The tumid condition of the mucous membrane and the tenacious secretion constrict the channel of the duct, and impede the excretion of the bile, which occasionally is even completely arrested.

These changes are most frequently found in the lower portion of the ductus choledochus and in the gall-bladder; they are of rarer occurrence in the hepatic duct and its roots.

Catarrhal inflammation of the biliary passages in most cases terminates after some weeks, without leaving any trace behind: the relaxed condition of the mucous membrane disappears; the secretion regains its normal characters; and the flow of bile again becomes free.

In rare cases, particularly when the cause is protracted in its operation, the process assumes a chronic form. Under such circumstances, the walls of the ducts become thickened; the obstruction to the secretion causes them to dilate, this dilatation sometimes extending uniformly over long tracts, but at other times assuming the form of oval sacs.[2] Deposits or concretions are then sometimes formed in the stagnant secretion, which abounds in mucus; occasionally, also, the walls of the ducts ulcerate, and cavities of greater or less size, resembling abscesses, are developed. (Observation No. XXXII.) Such serious lesions are, on the whole, of rare occurrence in simple catarrh, but they are more common in those cases where the ducts are closed up by concretions or morbid growths.

In exceptional cases, solitary ducts in the liver remain closed after cessation of the catarrh, and patches loaded with bile-pigment and containing dilated ducts are found scattered throughout the liver, whilst the greater portion of the gland has regained its normal color and character.

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[1] In a female, twenty-three years of age, who died on the ninth day after the commencement of an attack of catarrhal jaundice, from peritonitis consequent upon invagination of the bowel, I found the duodenal opening of the ductus choledochus constricted and closed up by a plug of white mucus; behind this obstruction, the ducts were dilated, and their mucous membrane exhibited no trace of inflammation.

[2] See under the head of Dilatation of the Biliary Passages.

Catarrh of the gall-bladder occurs tolerably often, independently of any implication of the remaining ducts. It is very apt to supervene, when, in consequence of prolonged abstinence or any other cause, the bile in the gall-bladder has been stagnant for a long time, and has become inspissated and altered in its composition. Under such circumstances, as will be subsequently shown, it may be the essential cause of the formation of concretions, the contents of the gall-bladder being for a long time isolated, owing to the catarrhal tumefaction of the neck of the bladder and of the cystic duct, so that the nuclei of gall-stones are formed by the mucus which abounds in calcareous matter.

On the other hand, catarrh of the gall-bladder is frequently the consequence of previously existing concretions. In this case the affection often leads to exudative inflammation and ulceration, and occasionally to perforation, and serious alterations in the nutrition of the walls of the gall-bladder, such as obsolescence and calcification—lesions, to the consideration of which we shall return hereafter.

2. *Etiology.*

Catarrhal inflammation of the biliary passages originates most frequently, in the propagation of a catarrhal condition of the stomach and intestines, from the duodenum to the ductus choledochus. Out of 41 cases of the disease I have succeeded in discovering premonitory symptoms of gastro-enteric catarrh in 34. Hence, all the injurious agencies that induce gastro-enteric catarrh, such as overloading of the stomach, indigestible food, spirituous liquors, and also chills and other atmospheric influences, which give rise to a large number of gastric affections during summer and autumn, may lead to the development of catarrhal jaundice. This explains why the disease is now and then observed to be epidemic.

Another source of catarrh of the biliary passages lies in those affections of the liver, which induce a hyperæmic condition of the mucous lining of the ducts. To these affections belong the various forms of hepatic hyperæmia, and chronic inflammation, and more rarely, the fatty and waxy degenerations of the gland.

Hence, slight causes are sufficient to give rise to jaundice, in individuals suffering from the morbid changes of the hepatic parenchyma just mentioned.

The presence of foreign bodies, such as concretions, round worms, distomata, &c., constitutes another cause of catarrh of the biliary passages.

3. *Symptoms and Progress of the Disease.*

The disease usually commences with the symptoms of catarrh of the stomach, viz.: distention and tightness of the epigastrium, furred tongue, loss of appetite, nausea, &c., which are sometimes accompanied by slight fever. The bowels are in most cases confined; but more rarely there is diarrhœa, in consequence of the intestinal catarrh. After these complaints have lasted for several days, or in exceptional cases for some weeks, a jaundiced color of the skin and urine is observed, accompanied by the other symptoms of jaundice, diminished frequency of pulse, itching of the skin, &c. At the same time, the fæces become paler and gradually assume a clay-like character; the hepatic dulness is increased, and the right hypochondrium becomes tender upon pressure. In a few cases the gall-bladder can be felt as a pear-shaped tumor at the margin of the gland.

Meanwhile, the gastric symptoms either continue or entirely cease, so that the patients, apart from the yellow color and the sluggish condition of the bowels, make no complaint.

The jaundice in most cases lasts three weeks, and then the motions regain their normal color, the urine becomes paler and loses its bile-pigment, while the skin gradually resumes its former tint.

It happens more rarely, that the morbid process is protracted, and lasts from three to four months before the customary discharge of bile returns. (See Observation No. XXX.)

Such is the ordinary course taken by catarrh of the biliary passages originating in the stomach or intestinal canal. Those forms which supervene upon diseases of the hepatic parenchyma are of shorter or longer duration, according to the nature of the primary hepatic affection; in most cases they pass off more rapidly, the jaundice is of a fainter tint, the bile does not disappear entirely from the intestinal contents; the digestion suffers less, but the symptoms are more apt to return.

In those cases where the catarrh is the result of concretions, it is usually preceded by symptoms of colic, and the progress of the disease is uncertain; in most cases it is greatly protracted and leads to symptoms of a serious nature, while on the other hand, it may terminate favorably within a short period. Here everything depends upon the number and the size of the concretions.

Catarrhal inflammations, which remain limited to the gall-bladder, as a rule only give rise to temporary derangements; jaundice is wanting; the patients complain of dull pains in the region of the gall-bladder, and this organ may sometimes be felt as a distinct tumor; at the same time there is nausea and slight fever. (See Graves, *Clinical Medicine*, 2d Edit., Vol. II., p. 259.)

The derangements are frequently so inconsiderable that the disease is completely overlooked.

4. *Diagnosis.*

The diagnosis of simple catarrhal jaundice is, as a rule, easy; the preceding or accompanying symptoms of gastro-enteric catarrh, the slight nature or complete absence of any changes in the liver, the sudden development of the disease, in young, otherwise healthy persons, together with the trifling derangement of the general health, are the points on which we may found our diagnosis. In no case, however, ought we to neglect to determine the absence of other diseases of the liver by careful examination, if we wish to guard against mistakes. The jaundice which supervenes upon cirrhosis, cancer, and other serious lesions of the liver, may resemble the simple catarrhal form very closely, and frequently can only be distinguished after careful examination. Where obliteration of the ductus choledochus, or of the hepatic duct, or the compression of these ducts by small tumors inappreciable on palpation, is the cause of the jaundice, a certain diagnosis can only be arrived at by watching the progress of the disease. It has already been pointed out (Vol. I., Chap. V.) that the early stages of diffuse hepatitis and of acute atrophy are sometimes very readily mistaken for catarrh of the biliary passages.

The catarrhal inflammation arising from the presence of concretions is usually recognized by the severe pains, resembling cardialgia, or of an inflammatory nature, as well as by the rapid appearance and disappearance of the jaundice; there are exceptional cases, however, the real nature of which is made known by unequivocal symptoms, at a late period only.

5. *Treatment.*

The treatment of catarrh of the biliary passages has reference, in the first place, to a removal of the causes. So long as gastric disorders exist, our efforts should be directed against them. When the tongue is thickly coated, and at the same time there is nausea and distention of the abdomen, an emetic of the Potassio-Tartrate of Antimony is to be administered, at first in repeated small doses, and afterwards in a full dose. When the stomach is less prominently affected, saline purgatives, decoction of Tamarinds or of Grass Root,[1] with Sulphate of Soda, Bitartrate of Potash, &c., are more suitable. In the event of diarrhœa being present, we must have recourse to an Infusion of Ipecacuanha or to Dover's Powder. The same measures, together with a warm bath, are adapted to the cases, where the catarrh of the bile ducts originates after a chill. The diet should be restricted to mild vegetable substances.

When the disease is protracted, the bowels are to be kept open by Infusion of Rhubarb with Carbonate of Soda, or by small doses of the Aqueous Extract of Aloes, Tincture of Colocynth and similar remedies. In obstinate cases, in order to remove the plug of mucus from the ductus choledochus, we may have recourse to an emetic, by means of which the contents of the bile-ducts are forced towards the ductus communis; but we must only venture upon this treatment when the diagnosis is perfectly certain.

In addition to these remedies, I have observed benefit from the employment of the vegetable acids, such as Lemon-juice, to the amount of 1½ or 3 ounces daily, the Bitartrate of Potash, and the mineral acids, more particularly the Nitro-muriatic.

When catarrh of the biliary passages becomes habitual, and exists in conjunction with fatty degeneration, hyperæmic swelling, or chronic inflammation of the liver, the mineral waters of Karlsbad, Marienbad, Kissingen, or Homburg, and when the patient's constitution is strong, the saline springs of Eger and the Kesselbrunn of Ems are to be recommended.[2] Decoctions of Herbs and the Grape-cure are likewise suitable in such cases, or, when there is no opportunity for having recourse to these modes of treatment, we may substitute the bitter extracts, such as Extract. Gramin. Extract. Taraxaci, Extract. Card. Benedicti,[3] Extract. Chelidonii, &c.[4]

When concretions are present, the treatment adapted to them must be employed.

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[1] *Extractum Graminis* is the extract prepared from the root of Triticum repens, or Couch Grass, which is said to contain sugar and free oxalic acid.—Transl.

[2] For the mineral constituents of these springs, see Vol. I., p. 88, *note*, and p. 65, *note*.—Transl.

[3] *Extract. Cardui benedicti* is an extract of the leaves of the *Carduus benedictus*, a species of thistle, the chief constituent of which is a bitter extractive matter.

[4] *Extract. Chelidon.* is the extract prepared from the juice of *Chelidonium majus* or celandine. It is acrid and bitter, and sometimes followed by narcotic effects.—Transl.

The remarks already made (Vol. I., p. 84) upon the treatment of jaundice in general, may likewise be referred to.

6. *Illustrative Cases.*

Out of a large number of observations, I only select the three following, as illustrations of the different forms of the disease.

OBSERVATION No. XXIX.

Fit of Anger during Menstruation.—Symptoms of Gastric Catarrh.—Jaundice.—Pale Stools, which regained their color in a few days after the use of Rhubarb with Carbonate of Soda.—Intermittent Fever removed by means of Quinine.—Recovery.

W. Kramer, aged 21, was admitted into the Charité Hospital on the 4th of March, and was discharged on the 2d of April, 1860.

The patient stated, that three weeks before, during menstruation, she had been very angry; her appetite ceased; she had repeated rigors, and experienced severe itching of the skin. Eight days afterwards, her skin became jaundiced, a yellowish tint having been previously observed in the conjunctivæ. Subsequently, the urine assumed a dark-brown hue, whilst the froth upon it was yellow; at the same time the stools lost their color and became hard, although the bowels were not confined. There was slight tenderness at the epigastrium; the liver was not greatly enlarged; the spleen was hypertrophied to a moderate extent.

During the few days preceding admission, the employment of Infusion of Rhubarb with Bicarbonate of Soda, was followed first by firm, and afterwards by copious thin, bilious stools; the urine became paler; the remaining symptoms continued. On March 8th, scanty menstruation came on.

About 3 A.M. of the 9th of March, a severe rigor set in, which lasted four hours, whilst the gastric symptoms became aggravated by the supervention of pains in the region of the stomach. The rigor returned during the three following nights, every time at an earlier hour, but was only accompanied by heat and sweating on the fourth occasion, when a slight rigor occurred late in the afternoon of the 11th. On the afternoon of the 12th, without any antecedent rigor, intense heat set in, which lasted till midnight, and was followed by a cold sweat. During this day, while the patient was still taking the infusion of Rhubarb, the stools continued colored, and of the consistence of a thick pulp; the urine was dark-brown, with a green froth; the jaundice was remarkably diminished, and the itching of the skin had ceased. Menstruation stopped on the 10th.

After the employment of Sulphate of Quinine, the intermittent symptoms disappeared. Pains in the head, occasional sleeplessness, coated tongue, and loss of appetite continued, until the bowels, which were now confined, were regulated by means of purgatives, whereupon all the morbid symptoms disappeared, so that on the 26th of March the girl felt perfectly well, and only a slight jaundiced tint of the conjunctivæ was discoverable. On the 2d of April she was able to be discharged well.

Here the disease ran a very rapid course; but in the following case it was protracted over several months, and only yielded to the use of the mineral waters of Karlsbad, after the ordinary remedial measures had been tried in vain.

OBSERVATION No. XXX.

Repeated attacks of Intermittent Fever.—Feeling of tightness in the Epigastrium and Right Hypochondrium, lasting for four weeks.—Jaundice.—Employment of Benzoic Acid, an Emetic, Carbonate of Soda and Rhubarb, and Aqua Regia, without any effect upon the Jaundice, which ultimately, after lasting fifteen weeks, disappeared under the use of the Mineral Waters of Karlsbad.

Gräfarth, aged 33, was admitted on the 14th of February into the clinical department of the Charité Hospital, and was discharged on the 7th of April.

At the age of 17 he suffered for a short period from intermittent fever. In the year 1849 he passed through an attack of abdominal typhus, and three years afterwards he had a second attack of intermittent fever, lasting for fourteen days. Since then he enjoyed constant good health, until three months before admission. At that time he began to suffer from pains in the epigastrium and right hypochondrium, without any remarkable derangement of the general health. After these pains had lasted for four weeks, the skin was observed to present a yellowish tint; the color of the stools was grayish-white, and the urine was dark. During a treatment of five weeks in another Clinique, the jaundiced color of the skin was said to have somewhat diminished; during the last three weeks the patient had taken no medicine. His appetite and general health were good. ℞:—Sodæ sulph. ℥ j.; Sodæ Bicarb. ʒ ij.; aquæ ℥ viij.; Sacchari Alb. ℥ j.; ♏. Sumat cochlear mag. j. secunda q.q. horâ.

No change took place in the above-mentioned symptoms during the first days of the patient's stay in the Hospital. The stools and urine retained their abnormal color. After taking four doses (five grains every hour in the form of powder) of Benzoic Acid, the dark reddish-brown color of the urine became converted into reddish-yellow, and hippuric acid could be discovered in it.[1] The jaundice, however, underwent no change, and even an emetic of Antimony with Ipecacuan, although it occasioned repeated vomiting, failed to produce any effect upon the stoppage of bile. The two following prescriptions were likewise tried in succession without any benefit:—℞:—Infus. Rhei ℥ vij.; Sodæ Bicarb. ʒ ij.; Syrup. Aurant. ℥ jss. ♏. Sumat cochlear mag. j. secunda q.q. horâ. ℞:—Acid. Hydrochlor. Acid Nitr. āā ʒ ss.; Aquæ Destill. ℥ iv.; Sacch. ℥ ss. ♏. Sumat cochlear mag. j. tertia. q.q. horâ.

March 1st: Profuse sweating in the morning, followed by great exhaustion; itching in the soles of the feet. Tongue clean; appetite good; three stools daily, of the consistence of thick pulp and of a grayish-white color, as formerly. The urine was dark brownish-yellow, and tolerably clear; it assumed a still darker color after long standing.

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[1] W. Kuhne has found that benzoic acid is not converted into hippuric acid in persons laboring under jaundice. I am unable to confirm this statement, inasmuch as I have repeatedly found benzoic acid converted into hippuric acid in the urine, in jaundice, from various causes, such as catarrh of the bile-ducts, cancer of the liver, and cirrhosis. Neukomm's experiments led to the same result. After the use of benzoic acid, as much hippuric acid was found to be present in jaundiced urine as in the urine of persons who had no jaundice. (See experiments in the Appendix.)

March 2d: Had a good night; no perspiration; general health improved; the itching in the soles of the feet was constantly present.

During the next few days, the jaundiced color of the skin appeared to increase, and accordingly, on the 8th of March the patient was ordered to drink three cups of water from the Karlsbad Millspring,[1] every morning.

On March 10th the urine was somewhat paler, and the grayish-white color of the stools was converted into a grayish-brown.

On March 16th the patient felt well; the appetite and digestion were perfectly good. Since the afternoon of the previous day the stools had acquired a yellowish-gray color, and a semi-solid consistence; the jaundiced color of the skin appeared to be diminishing. On the 18th the patient was ordered to take four cups of the Karlsbad Millspring daily.

On the following day the color of the stools was dark-yellow. Ultimately they regained their normal color and consistence; the urine grew paler, and became of a golden-yellow hue; the jaundice color of the skin gradually diminished more and more. The appetite and digestion were in a satisfactory state, and the general health was good.

On the 7th of April the man was discharged, cured.

OBSERVATION No. XXXI.

Intermittent Fever, cured by means of Quinine.—Urticaria.—Jaundice, sometimes with pale and sometimes with colored stools.—Persistent and profuse Hæmorrhage from the Stomach and Intestines.—Œdema of the Feet.—Ascites.—Death from Exhaustion.

Autopsy:—Small, somewhat indurated Liver, presenting patches of an olive-green color, in which the capillary Bile-ducts were dilated.—Destruction of a portion of the Capillaries of the Portal Vein.—No Ulceration of the mucous membrane of the Stomach and Intestines.

Aloys Kuhnert, aged 48, a laborer, was under treatment from January 1st to April 6th, 1858.

He came into the Hospital suffering from an attack of intermittent fever, which had lasted for several weeks, and which yielded to the use of Quinine. On the 25th of January, when he was to have been discharged, as he appeared quite recovered, he was suddenly seized with a severe rigor, followed by heat; and the next day the skin was thickly covered with an eruption of urticaria, while at the same time there was loss of appetite, vomiting, and diarrhœa. The symptoms of gastric catarrh, and the diarrhœa ceased on the following day, but the eruption continued visible for three days.

On January 28th the urine, for the first time, presented a jaundiced tint; the stools were clay-like; and the pulse was reduced in frequency. On the 29th the skin was yellow, and by the 3d of February there was intense jaundice. The Elixir Proprietatis Paracelsi[2] was prescribed. Although, on the following day, the stools were colored brown, the color of the skin and urine remained unaltered.

On February 9th the stools were again clay-colored, while, on the other hand, the urine was paler. The appetite was good, and the patient slept well. Pulse 60; some itching of the skin.

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[1] See Vol. I., p. 42.—TRANSL.

[2] The *Elixir Proprietatis Paracelsi* is a remedy frequently mentioned in German works on medicine. It is a spirituous solution of aloes, myrrh, and saffron, with the addition of a little dilute sulphuric acid.—TRANSL.

On February 13th about six ounces of fluid dark blood were passed, along with a pale-brown firm stool. Urine copious, still deeply tinged with bile.

The bloody stools continued until the 3d of March, although the aloetic remedies were omitted, and recourse was had to Alum injections.

On February 23d, pulse 84; great apathy and prostration; appetite bad; tongue clean; urine extremely dark; stools pale; slight ascites. The perpendicular hepatic dulness in the right mammary line measured 11 centimètres (4½ Eng. inches); in the epigastrium there was no dulness whatever on percussion, but only the stomach-sound. Seltzer-water was prescribed.

On February 25th, the urine no longer yielded distinctly the reaction of bile-pigment; its specific gravity was 1009; the stools were liquid and dark-red, and again contained large quantities of blood.

March 3d. After the administration of Ergotine no more blood was passed on this day with the stools; the urine was much paler; the jaundice was diminished; the appetite was improved; and the stools were brown. Pulse 72.

On March 5th the urine was again perfectly black. Stools brown. Appetite and sleep good; pulse 84, and small.

On March 10th there was a moderate amount of ascites, and the feet were likewise somewhat œdematous. The liver was pushed greatly upwards by the tympanitic intestines. The urine was again deeply tinged with bile, and the stools were clay-colored. The epidermis was separating in large scales. Rhubarb was prescribed.

On March 15th, pulse 76; urine somewhat paler; specific gravity 1014; one stool was passed which was again brown. The ascites and œdema of the feet were increasing.

On March 23d, pulse 96. During the night had an attack of rigors, which lasted for half-an-hour. Jaundice somewhat diminished.

On March 24th, pulse 124; great prostration and vomiting of yellow bilious matter. The urine, and likewise the stools, were intensely brown. Effervescing draughts, with Bitter Almond Water, were prescribed.

On March 25th, vomiting of black matter, which ceased during the night after the administration of Alum. There was tenderness in the pyloric region of the stomach. The appetite was completely absent; no stool since yesterday. Pulse 108.

On March 26th the stomach was greatly distended; the stools were brown and rather thin, and contained reddish blood, which, however, soon disappeared.

On March 29th, there was great tympanites; the liver was pushed upwards to the fourth rib; pulse 100, and small; respirations 36; constant nausea; brown stools and very dark urine. The patient now became rapidly collapsed, notwithstanding the administration of analeptics. The scrotum became gangrenous; the evacuations were passed involuntarily; the pulse rose to 132; hiccup and somnolence. Death occurred on April 6th.

Autopsy, 25 *hours after death.*

The body was jaundiced, and the skin was covered with epidermis, peeling off in scales. The lower extremities and the abdomen were swollen from dropsical effusion.

The skull-cap was normal; the brain-substance was œdematous; the cerebral membranes were anæmic.

The pharynx and œsophagus were filled with a material resembling coffee-grounds; their mucous membrane was somewhat softened.

The larynx and trachea were slightly injected.

Both pleural sacs contained a considerable quantity of serous fluid. The lungs were moderately congested, and, inferiorly, in a state of hypostasis; at their apices were firm bands of adhesion.

The pericardium contained about two ounces of yellow serum. The heart was covered with a thick layer of fat, and the right ventricle contained firmly-coagulated blood. The valves presented a jaundiced tint, but were in other respects normal.

The spleen was 5 inches long, 3 inches broad, and 1 inch thick. Its parenchyma was firm and dark-brown.

The stomach was filled with a large quantity of matter, like coffee-grounds, and its mucous membrane presented numerous hæmorrhagic erosions. There was no disease of the pylorus.

The pancreas was dense and firm.

The liver was small, and measured transversely 5¾ inches; from behind forwards, on the left side, 3¾ inches, and on the right side, 5 inches; and in thickness, 3 inches. An olive-green patch, of irregular form, was observed upon the convex surface of the right lobe. This patch was sharply defined at its edges, and projected somewhat beyond the surrounding parenchyma, and was considerably softer than it; it sank deeply into the interior of the gland. Similar patches were found in the left lobe, and in still larger number on the concave surface of the organ. On closer examination, it was ascertained that the hepatic cells at these places were infiltrated with pigment, and that numerous greatly dilated bile-ducts filled with yellow epithelium and stagnant secretion lay among them. These ducts belonged to the terminal ramifications of the hepatic duct; the larger branches were entirely exempt from the morbid changes described. The hepatic artery, the portal vein, and the hepatic duct were injected with materials of different colors. Wherever the hepatic tissue presented its natural color, the substance injected into the bile-ducts penetrated as far as the capillaries of the lobules, but in the olive-green patches, the capillary ducts were only filled at a few points. The hepatic artery was more fully injected than is usually the case, numerous delicate branches being observed in the interlobular zones. The portal vein, on the other hand, was very imperfectly filled, some of its branches in the connective tissue between the lobules (which in fine sections appeared to be much more abundant than usual) being destroyed; the substance injected into this vessel had scarcely penetrated at all into the olive-green patches.

The consistence of the liver was increased; the gall-bladder was empty; the hepatic duct and the ductus choledochus were unobstructed, and their lining membrane was normal.

The mucous membrane of the duodenum and jejunum appeared slightly injected; that of the large intestine was somewhat softened, and covered with black fæcal matter. No ulceration could be discovered anywhere.

The kidneys were jaundiced, but were in other respects normal; the urinary bladder was likewise normal.

This case was interesting in several respects. In consequence of intermittent fever, urticaria and jaundice were developed, which not unfrequently made their appearance simultaneously, and hence, exhibit an intimate connection. The jaundice at first presented the characters of the simple catarrhal form; but subsequently the portal circulation became obstructed in consequence of chronic hepatitis, and ascites, with hæmorrhage from the stomach and intestines, was the result. The chronic hepatitis, which I have repeatedly observed after intermittent fever (see Vol. II., p. 77), as well as the catarrh, must be regarded as the cause of the partial obliteration of the bile-ducts, and of the peculiar obstructions to the flow of bile occurring in distinct patches.

B. Exudative Inflammation of the Biliary Passages.

Exudative inflammation of the biliary passages sometimes occurs in the course of typhoid diseases, and gives rise to firm fibrinous products, or to purulent matter abounding in albumen. I have found the gall-bladder filled with a turbid, ash-colored fluid, of neutral or feebly alkaline reaction, in three cases of abdominal typhus, and in one of exanthematic typhus. When boiled, this fluid deposited numerous flakes of albumen; in two of the cases it was entirely devoid of bile-pigment or of the biliary acids, but in the two others, small quantities of these substances were discovered, together with some leucine. The lining membrane of the gall-bladder and of the ductus communis appeared softened and pale. No jaundice, nor any other sign of hepatic affection was observed during life. Louis (*Fièvre Typhoide*, 2 Edit., Tom. I., p. 28; Observ. 1, 11, 28, and 36), reports observations of a similar nature; the bile in these cases contained pus, while the mucous membrane of the gall-bladder was injected and thickened.

According to Rokitansky,[1] fibrinous exudations upon the walls of the gall-bladder, and sometimes even tubular investments of the bile-ducts, are developed in consequence of typhus, cholera, or pyæmia; their existence is not indicated by any symptom during life, and is not suspected until the examination of the body after death. In one case which came under my own observation, the exudation was restricted to the gall-bladder, and cholecystitis was developed, the presence of which could be recognized with ease during life. (See Observation No. XXXIII.)

Occasionally, diphtheritic exudations arise under similar circumstances and give rise to ulceration of the biliary passages, more particularly of the gall-bladder.

Sir Gilbert Blane found morbid appearances of this nature in the fever of Walcheren. The gall-bladder was in most cases distended with bile, which, when death occurred at an early stage, was usually dark-green or brownish-black, and in protracted cases resembled tar.[2]

Andral (*Clinique Médicale*, 4 Edit., Tom. II., page 549) observed the gall-bladder ulcerated, thickened, and filled with pus, in a case of typhus.[1]

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[1] See *Manual of Pathological Anat.*, Syd. Soc. Transl. Vol. II., p. 160.

[2] Budd refers this inflammation to the acrid character of the bile, and appeals, in support of his view, to the inflammation of the duodenum, which was observed by Boyle in the fever of Sierra Leone. From the observations which have been made in typhus, where the bile is sometimes completely absent, I think it is more probable that the exudation is formed upon the mucous membrane of the biliary passages, in a similar manner to the diphtheritic exudations upon the mucous membrane of the pharynx, the ileum, &c., where the inflammation cannot be attributed to the presence of any acrid matter.

Inflammatory conditions of the biliary passages, with purulent, fibrinous, or diphtheritic exudations, occur not only in the febrile infectious diseases, but likewise in cases where there is occlusion of the excretory ducts, and consequent obstruction to the excretion of bile. In Observation No. VII. (p. 69), a case of cancer of the liver is recorded, where the left branch of the hepatic duct was blocked up and filled with a dirty-brown juice and tubular coagula of the same color. More frequently the inflammation results from the irritation of biliary calculi. In cases where biliary concretions are present, the gall-bladder is not uncommonly observed to be filled with a purulent fluid, its walls are ulcerated and thickened, and adherent to the surrounding parts. The new tissues by which, under such circumstances, the walls of the gall-bladder are restored, undergo extensive degeneration, from the deposit of fatty and calcareous matter; and, ultimately, the coats of the gall-bladder resemble those of an atheromatous artery. In two cases I have met with such complete calcification, that the gall-bladder when emptied retained its form, owing to the presence of irregularly-shaped scales of bony matter, up to the size of a thaler (1¼ Eng. inch in diameter), which were developed in its walls.[2] Ulceration of the gall-bladder sometimes terminates in perforation and effusion of bile into the abdominal cavity.

This inflammation, with the consequent suppuration and ulceration, may lead to the formation of concretions in the bile-ducts of the liver, and in the ductus choledochus. We shall consider this morbid process hereafter, in discussing the doctrine of gall-stones.

Lastly, there are other forms of exudative inflammation of the biliary passages, which are developed independently of typhoid diseases, obstruction to the flow of bile, or the irritation of concretions, and which may lead to ulceration and perforation. Andral (*Clinique Médicale*, 4 Edit., T. II., p. 525) has described a case of this nature, where the inflammation apparently resulted from an obvious error in diet.

A man, aged 35, after an excess at table, was seized with severe pains at the margin of the right ribs, and on the following day with jaundice. Seven days afterwards, when the patient presented himself at the Charité Hospital, the pains still continued, and a movable pear-shaped tumor could be felt below the margin of the eleventh rib, extending downwards to the umbilicus. The other symptoms were constipation, loss of appetite, and moderate fever. The jaundice continued to increase in intensity for three days, when the patient was seized suddenly with a severe pain, commencing in the liver, and spreading over the abdomen. Soon afterwards, the extremities became cool, and the pulse small and frequent, and ultimately death supervened under symptoms of general peritonitis. On *post-mortem* examination, yellow purulent exudation was found in the abdominal cavity, more particularly on the right side; the inner surface of the duodenum was intensely injected; the opening of the ductus choledochus was swollen, the duct itself was narrowed, its walls were considerably thickened, and easily torn; the hepatic duct and the gall-bladder appeared greatly enlarged. Close to the point of junction of the hepatic and cystic ducts, an opening was observed in the former, as large as a pea; bile had escaped from this into the abdominal cavity, and had given rise to the fatal peritonitis. The error in diet had excited the duodenitis; the inflammation had then extended to the ductus choledochus, and constricted it, until at last the softened inflamed membranes ruptured, and effusion of the bile with its consequences ensued.

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[1] Here, likewise, ought to be mentioned the morbid condition of the gall-bladder, observed by Dowler, in the yellow fever of New Orleans, and designated by him "Oyster-like Degeneration" (Gross, *Patholog. Anat.*, p. 669). The wall of the gall-bladder was much thickened, infiltrated with a gelatinous material, and traversed by numberless white filaments. The bladder contained a transparent albuminous fluid, without a trace of bile.

[2] Fatty degeneration of the coats of the gall-bladder may take place under other circumstances. The epithelium of the mucous membrane not unfrequently becomes filled with oil-globules in patches, so that the inner surface of the gall-bladder presents an elegant white reticulum, an appearance which Virchow has attributed to the absorption of the fatty matter contained in the bile (*Archiv f. Pathol. Anat.*, Bd. XI., s. 574; and *Cellular Pathology*, Dr. Chance's Transl., 1860, p. 330).

Fatty degeneration of the sub-mucous tissue, accompanied by thickening and narrowing of the vessels, has been described by Böttcher (*Arch. f. Path. Anat.*, Bd. XI., 278).

Dance, in 1828, recorded a case of ulceration of the ductus communis, occurring independently of the irritation of a biliary calculus or of typhus.

Ulceration of the biliary passages may implicate the surrounding parts in various ways, and occasion further dangers.

1. Perforation and effusion of bile into the abdominal cavity. This accident occurs most commonly in the gall-bladder, and more rarely in the large ducts. The resulting peritonitis is, in most cases, speedily fatal, owing to the very irritating character of the bile. In exceptional cases, before the perforation actually occurs, adhesions are developed, which localize the inflammation of the peritoneum, and give rise to a circumscribed exudation, or the pus is confined behind the lesser omentum.

2. Fistulous communications between the gall-bladder and duodenum, colon, or pyloric portion of the stomach, or an external opening through the abdominal parietes. These modes of termination are most liable to occur when gall-stones are present, and imply the pre-existence of a slowly-advancing destruction of the walls of the gall-bladder, so that adhesions are developed prior to the occurrence of perforation (see section on Gall-stones).

3. Development of abscesses in the liver. The ulcerative process in the bile-ducts extends to the surrounding hepatic tissue and destroys it. In this way large cavities filled with pus are developed, which are in direct communication with the ducts, just as the saccular dilatations of the bronchi communicate with the affected bronchus. The wall of these cavities is not at all, or only partially, lined, by the mucous membrane of the duct; but, like that of abscesses, is formed by the discolored and condensed hepatic tissue. In other cases, the inflammation extends, as such, to the surrounding glandular tissue, and fibrinous deposits take place along the diseased bile-ducts, or rounded deposits are formed at their extremities, which are converted into abscesses, presenting all the peculiarities and consequences of other forms of suppurative hepatitis (see Vol. II., on this point, p. 136).

In a female, aged 27, who had died under symptoms of suppuration of the liver, with pyæmia, Lebert (*Anat. Pathol.*, T. II., p. 272; Plate CXXV., Fig. 6), found the bile-ducts, as far as their roots, distended, filled with calculi, and at some places in a state of suppuration. At the same time there were numerous abscesses up to the size of a nut, several of which were situated beneath the serous covering of the gland. Several metastatic deposits were likewise found in the lungs and in the spleen.

Another case, from my own experience, will still further elucidate this form of disease.

OBSERVATION No. XXXII.

Pains in the Right Side.—Fever.—Constipation.—Vomiting of bitter, greenish matter.—Cough, with mucous expectoration.—Aggravation of the pains in the region of the Liver.—Pleuritic friction.—Repeated vomiting.—Rigors.—Painful Distention of the Abdomen.—Slight Jaundice.—Increasing Exhaustion.—Death.

Autopsy:—The enlarged Ductus Choledochus and the Branches of the Hepatic Ducts, filled with yellow, semi-solid concretions.—Inflammation and Ulceration of the Mucous Membrane of the Biliary Passages.—Abscess in the Liver, as large as a child's head.—Perforation of the Capsule of the Liver by another Abscess of smaller size.—Escape of Bile into the Abdominal Cavity.—Peritoneal Exudation.—Slight Pleurisy and circumscribed Pneumonia.—Bronchial Catarrh.

Anna Klotz, aged 68, the wife of a soldier in the Royal Guards, was under treatment in the Charité Hospital at Berlin, from the 9th to the 16th of February, 1861.

The patient stated that her previous health had always been good, and that up to four weeks before admission she had been able to work. About this time she had a rigor, followed by heat and severe stitches in the right side, which were increased by coughing and by deep inspirations. Her medical attendant prescribed an emetic, which, however, afforded no relief. The bowels had been confined since the commencement of her illness, but more especially latterly; there was no appetite. During the last six days, the patient had been particularly troubled with great dryness of the tongue, extending to the pharynx and larynx. In the first few days after admission the principal symptoms that presented themselves for treatment were great debility, pains in the head, and sometimes also in the stomach and hepatic region, and constipation of the bowels, which were kept open by means of Enemata and Rhubarb. There was occasional vomiting of a greenish-gray, bitter matter. A moderate amount of cough, with slight mucous expectoration. The temperature of the skin varied between 36°.8 and 38°.6 C. (from 98°.2 to 101°.5 Fahr.) The pulse varied from 88 to 100 in the minute, and the respirations from 24 to 32.

February 11th. The patient passed a stool of normal color last night, and slept during the night, there having been no return of the vomiting; but the dyspnœa was greatly increased, and râles were extensively audible over the lungs. There was acute pain at the margin of the right false ribs, where a slight grating sound could be heard with the stethoscope. The liver was considerably enlarged, and tender upon pressure. The tongue was covered with a brownish-black coat; insatiable thirst; pulse 100, and hard. Cupping over the right side of the thorax was prescribed.

February 13th. During yesterday the stools were normal, but in the evening the patient suffered from great dyspnœa, and during the night from sleeplessness. It was stated that she had had a rigor, but this was not ascertained with certainty. This morning she complained of pains in the right hypochondrium, extending downwards two inches below the margin of the ribs, but not beyond the median line. Vomiting; appetite slight; pulse smaller, 120.

On the following day, after a good sleep, the pains were relieved, but in the night the patient vomited a grayish-brown fluid matter.

February 15th, insatiable thirst; two attacks of vomiting; tongue dry and fissured. There was a swelling upon the right side of the lower jaw, which could not be felt from the inside of the mouth. The epigastrium was distended and tender upon pressure, particularly at a spot about two inches from the margin of the ribs, in the right mammary line. The abdominal parietes were rigid. No appetite and no motion of the bowels; pulse 136. Warm Cataplasms and an Enema were prescribed.

In the course of the day, there was repeated vomiting of greenish matter. The tenderness in the region of the gall-bladder was not relieved. Somnolence supervened, and the pulse was scarcely perceptible.

Death occurred on February 16th, at 6½ A.M.

Autopsy.

Skin dirty-colored, with a shade of yellow.

Both lungs were rather firmly adherent at isolated places. There was slight emphysema of the upper lobe of the right lung; the left lung was very œdematous. There were patches of lobular pneumonic exudation in the lower part of the left lung, and in the lower part of the upper lobe of the right lung. The bronchi were filled with a large quantity of gray pus, and isolated fibrinous flakes were observed on the pleural surface of the lower lobe of the right lung.

A turbid fluid, of a somewhat yellow color, was found in the right side of the abdominal cavity, and in this locality the coils of intestines were firmly adherent and tinged with bile. A thick fibrinous exudation was deposited upon the colon, the serous membrane of which was intensely injected.

The spleen was small and flabby, but presented no morbid change of importance.

On the right lobe of the liver, corresponding to the axillary line, a perforation was found almost as large as a five-groschen piece,[1] from which a bilious fluid had escaped over the surface of the gland and the adjacent portions of intestine. The duodenum and the colon were adherent to the gall-bladder, which was shrivelled up, and contained tenacious, colorless mucus. The mucous membrane of the duodenum was moderately thickened, and covered with a grayish-white fluid. The ductus choledochus at its commencement was enlarged to the size of a little finger. One inch above its orifice it contained an ochre-yellow, crumbling, conglomerate mass, almost as large as a hen's-egg, made up of two large and several smaller calculi; behind this mass were a number of smaller concretions, together with a turbid, yellow fluid.

The posterior portion of the right lobe of the liver was firmly adherent to the diaphragm; and presented a globular, fluctuating prominence. On making a section at this place a cavity was opened, almost as large as a child's head, and filled with grayish-red, purulent fluid. Its walls were smooth and dark, and covered here and there with gray shreds. The cavity was traversed by several trabeculæ of firm tissue, passing from one side to the other.

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[1] The diameter of a five-groschen piece is about equal to that of an English inch.—TRANSL.

Below this abscess was situated the perforation above mentioned, from which the bile had flowed into the peritoneum. It led into a cavity the size of a pigeon's egg, which was not at all connected with the abscess already described. The bile-ducts of the liver were all greatly dilated, and filled with an ochre-yellow, crumbling mass; their lining membrane was injected, and at some places ulcerated. A greatly dilated duct led directly into the large cavity of the abscess. The hepatic parenchyma was of a dirty-yellow color, and here and there it presented grayish-white infiltrations, from the size of a pea to a walnut, in which the outlines of the lobules were still visible. The capsule of the liver, and particularly the suspensory ligament, were reddened and covered with exudation.

The mucous membrane of the stomach and intestines was softened, and, at some places, of a slaty-gray color. The rectum contained dark rounded scybala.

The uterus was large and contained bloody mucus. The right ovary was converted into a cyst, and there was a quantity of exudation in the plica Douglasii.[1]

Clear brown urine was found in the bladder.

4. Suppuration of the bile-ducts may lead to pylephlebitis, owing to the inflammation attacking the venous coats.

This process has been described at p. 139, so far as the observations hitherto recorded permit.

As a result of this affection, communications are sometimes established between the branches of the portal vein and the bile-ducts, by means of which blood may enter the bile-ducts. According to Budd (*Diseases of the Liver*, p. 205), simple ulceration of the gall-bladder may even give rise to profuse hæmatemesis, similar to that resulting from a gastric or duodenal ulcer.

Budd's observation referred to a man, 18 years of age, who, without any premonitory symptoms, was seized with bloody vomiting and pains in the epigastrium. Under general and local bleeding and the internal use of Sulphuric Acid, the patient was seemingly in full convalescence, when death took place from an attack of cholera. The autopsy revealed an adhesion of the stomach to the lower surface of the liver and the gall-bladder. The gall-bladder contained some pus; its mucous membrane was extensively destroyed by ulceration; the liver was in other respects normal; there were no gall-stones. The lining membrane was red from the injection of small vessels, while that of the intestines exhibited the changes usually observed in cholera.

Under certain circumstances, inflammation of the biliary passages leads to their constriction and obliteration. This is particularly the case with those forms where the inflammation is circumscribed, or where it results from the impaction of a gall-stone. Sometimes constriction or obliteration may be produced by the cicatrization of ulcers, and occasionally by inflammatory processes, developed independently of any mechanical irritation, by propagation from the intestine, or in some other way. The changes in question occasionally extend over large tracts of the ducts, while at other times they are only observed at circumscribed places, and resemble strictures of the urethra. Bristowe (*Transactions of the Path-*

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[1] See p. 354, *note.*

ological Society of London, Vol. IX., p. 223) has described such a stricture, which occurred in the left branch of the hepatic duct, and measured only a quarter of an inch in length. Behind the stricture, the branches of the duct within the liver were much dilated, and contained light-yellow biliary fluid, loaded with yellow, sand-like matter, and darker concrete masses of comparatively large size. The liver was at some places in a state of cirrhotic induration, and its right lobe contained an abscess the size of a walnut. The ductus choledochus, the cystic duct, and the right branch of the hepatic duct were pervious.

Obliteration of the cystic duct is a tolerably frequent morbid appearance, and, in most cases, is the result of irritation of the neck of the gall-bladder from concretions. It leads, as we shall subsequently see, to dropsy of the gall-bladder.

Moreover, it is not a very rare occurrence for the gall-bladder itself to be obliterated, the inflammatory process having converted its walls into a fibrous, callous tissue, and its contents having been removed by absorption, or by the formation of a communication with the intestine. Ultimately, there remains nothing but a contracted capsule containing a mucous fluid, or firmly embracing a few gall-stones. Fig. 19 represents an obsolete gall-bladder of this nature, filled with concretions.

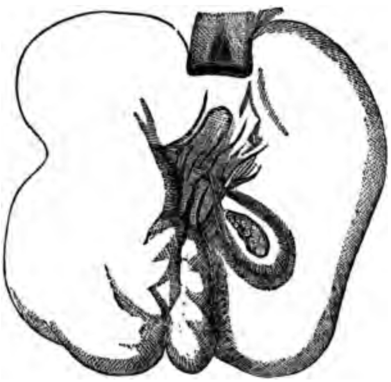

FIG. 19 represents a gall-bladder, which has become obsolete in consequence of inflammation of its coats, and which is filled with gall-stones.

In cases where such an obsolescence of the gall-bladder exists, the bile passes directly from the liver into the intestine, without any injurious consequences to digestion. The opinion, which has occasionally been expressed (*Diction. de Médec.*, IV., p. 241), that the condition in question occasions an increase of appetite, has not been confirmed in my experience.

Symptoms.

The existence of exudative inflammation of the biliary passages is not indicated by any definite symptoms, until it induces a stoppage of the bile from constricting the ducts, or serious derangements from implicating the hepatic parenchyma or branches of the portal vein. Those forms which are developed in the course of typhoid diseases, are in most cases totally devoid of symptoms, the slight derangements which they occasion being obscured by the more serious symptoms of typhus.

Inflammation of the gall-bladder is usually recognized by a feeling of tightness, and by a painful swelling in the region of the bladder. A movable, pear-shaped tumour tender upon pressure, can be felt at the margin of the liver. This tumor, however, is only present when the communication of the gall-bladder with the ductus choledochus is destroyed, owing to implication of the cystic duct; when this duct is not obstructed, the bladder does not become distended, and the symptoms are often of such an indefinite character, that it is impossible to form a certain diagnosis from them. I have repeatedly found ulcers of the mucous membrane of the gall-bladder at *post-mortem* examinations, the existence of which had not been suspected during life. The occurrence of perforation is first announced by the signs of acute peritonitis.

Exudative inflammation of the ductus communis and of the hepatic duct presents the same characters during life as catarrh of these ducts, and is undistinguishable from it, although the pains in the hepatic region and the febrile symptoms may be somewhat more severe. When the ducts ulcerate, abscesses are developed, or the branches of the portal vein become implicated, and rigors [1] supervene at irregular intervals, together with other symptoms of latent suppuration. These symptoms may last for months, as I have observed in three cases, varying in severity from time to time, and ultimately terminating in death from exhaustion, or in tedious convalescence. The abscesses of the liver and the pylephlebitis, which are developed under such circumstances, may be recognized by the symptoms mentioned under the heads of these affections.

From what has been stated it follows, that the diagnosis of the forms of disease under consideration is in general difficult. In every case of chronic jaundice, accompanied by pains in the liver, and by a lingering fever, we ought to be on our guard, and endeavor, by means of a carefully regulated diet and appropriate treatment, to obviate the symptoms before they assume the serious character above mentioned.

Treatment.

The object of treatment should be to limit the inflammation by means of an unirritating vegetable diet, by local abstractions of blood, and by mild saline purgatives. When the disease is protracted we may apply blisters from time to time, and administer the solvent extracts,[2] the mild alkaline mineral waters, such as the saline springs of Eger, the cold springs of Karlsbad, the water of Ems,[4] and others of a similar nature. When rigors supervene, we must have recourse to Quinine, and substitute at once a non-irritating nutritious diet, the Compound Infusion of Bark, and similar tonic remedies.

By way of further illustration, the following case of inflammation of the gall-bladder occurring in the course of abdominal typhus, may find a place here:—

OBSERVATION No. XXXIII.

Symptoms of Abdominal Typhus.—Bilious Vomiting on the thirteenth day, and discovery of a painful swelling in the region of the Gall-bladder on the fifteenth day.—No Jaundice.—Diminution of the size, and tenderness of the Tumor, after the employment of local antiphlogistics.—Great Anæmia.—Tedious Convalescence.

Louise Weiss, aged 26, a maid-servant, from Berlin, who had formerly suffered from various disorders of menstruation, but never from any hepatic affection, was suddenly seized on the 2d of June, 1860, with rigors, followed by dry heat, giddiness, occasional severe headache, and great debility. After some days the above symptoms were accompanied by a slight dry cough, and, in consequence of medicine that was administered, by violent diarrhœa.

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[1] Rigors alone, however, are not sufficient for the diagnosis of suppuration, under such circumstances. I have repeatedly known attacks of shivering produced by the simple irritation of gall-stones, similar to those which occur in consequence of the irritation of the urethra by the passage of a bougie.

[2] See Vol. I., p. 86 and 87, *note*.—TRANSL.

[3] See Vol. I., pp. 88 and 220, *notes*.—TRANSL.

On the ninth day of her illness the patient was admitted into the Medical Clinique of the Charité Hospital, with all the ordinary symptoms of abdominal typhus, of moderate intensity. The only remarkable circumstances were, that the diarrhœa ceased at an early stage, that the roseolous exanthem was not distinctly developed before the tenth day, and that, in consequence of the extraordinary adynamic symptoms, it was necessary to administer a vinous infusion of Quinine as early as the eleventh day.

On the thirteenth day the patient was suddenly seized with vomiting of bilious matter, which recurred on the fourteenth day. On the fifteenth day a very painful tumor was observed in the right hypochondrium. It was very firm; inferiorly and laterally its boundaries were easily defined, whilst superiorly it was felt to be in immediate connection with the liver. It had a pear-shaped form, and extended from the outer margin of the rectus abdominis muscle to midway between the mammary and axillary line. The sound on percussion was of a muffled tympanitic character, and superiorly passed gradually into the dull sound of the liver. The hepatic dulness in the axillary line measured 4¾ inches, in the mammary line 6 inches, and in the para-sternal line 6¼ inches. Towards the left it was impossible to define the liver accurately, owing to the great enlargement of the spleen.

Six leeches were applied, followed by cataplasms. The vomiting soon ceased, but the nausea continued for many days. The tumor became less painful, and the tension of the abdominal parietes diminished. There were no indications of obstruction to the flow of bile.

The resistance of the tumor gradually diminished; its boundaries could no longer be defined so accurately by means of palpation, and only with difficulty by means of percussion. On the twenty-third day of the disease, the following were ascertained to be the measurements of the hepatic dulness: in the axillary line 4¾ inches (as formerly); in the mammary line 5¼ inches (or ¾ inch less), and in the para-sternal line 5 inches (or 1¼ inch less).

In the meantime the typhus fever had passed through its various stages without any other complications. The fever gradually abated, and the intestinal functions again became regular, while the patient, who was in a very anæmic state, became convalescent. The gall-bladder, however, could still always be felt, although it was somewhat reduced in size, and was less tender upon palpation.

An analogous case of inflammation of the gall-bladder, developed during an attack of bilious fever and lasting for many months, which was observed by W. Pepper, will be subsequently detailed.

II.—CONSTRICTION AND OCCLUSION OF THE BILIARY PASSAGES.

Constriction or occlusion may occur in any part of the excretory apparatus of the liver, and may either be the result of disease of the ducts themselves, more especially inflammation, or may depend upon the condition of the surrounding parts, tumors pressing upon the ducts, rind-like deposits of connective tissue, &c.

It has already been explained under the heads of Cirrhosis, Inflammation, and Morbid Growths of the Liver, how the roots and fine branches of the ducts, in the interior of the liver, become constricted and obliterated.

Constriction of the ductus choledochus, as a rule, is referrible to catarrh, or exudative inflammation of the mucous membrane, or to the impaction of calculi. Obliteration likewise usually proceeds from inflammation, which induces either stricture, or extensive ulceration of the duct; more rarely, morbid growths are developed on the mucous membrane of the duct, or at its opening into the duodenum. In many cases the causes of the obstruction are found to be cords of connective tissue, constricting the duct in the hepato-duodenal ligament, or cancer of the lesser omentum, of the pylorus, or of the pancreas, or, in exceptional cases, an aneurism of the hepatic artery. These causes are dwelt on in full at p. 91 (*et. seq.*) of Vol. I., and are illustrated by Observations V., VII., VIII., and XIX. (Vol. I.).

The hepatic duct is occasionally occluded by morbid growths or concretions, and still more frequently is it compressed by tumors of the liver. On the whole, it suffers more rarely than the ductus communis.

The cystic duct is obliterated tolerably often, when the gall-bladder becomes inflamed from the presence of concretions or from any other cause, or when a calculus becomes impacted in the duct.

Every constriction, and still more, every occlusion of the bile-ducts entails retention of the secretion and a dilatation of the ducts, which, according to the site of the obstruction, is at one time limited to a few branches of the duct within the gland, or, when the hepatic duct itself is diseased, extends over all its branches, or, in the case of obstruction of the ductus communis, which is of much more frequent occurrence, involves also the large ducts together with the gall-bladder.

The symptoms and the progress of stricture of the biliary passages have already been discussed in detail in Vol. I., p. 90; where it is also shown how conditions of this sort may be recognized during life, and what are the principles according to which the treatment should be conducted.

III.—DILATATION OF THE BILIARY PASSAGES.

Dilatation of the biliary passages is almost without exception the consequence of the strictures above mentioned. In the rare cases, where dilatation of the ducts is found without any mechanical impediment, it may be shown that an obstruction existed at some former period, and that, after its removal, a state of atony remained, which prevented their contraction. I have observed two cases of this nature, and in both there had been gall-stones present, which, after having been impacted for a long period, passed into the duodenum by ulceration.[1]

It has already been stated, when speaking of Induration and Cirrhosis of the Liver, that the contractility of the connective tissue may give rise to dilatation of the ducts in these affections.

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[1] Cruveilhier (*Anat. Pathol.*, Pl. XII., p. 4) saw the gall-bladder enormously distended, and reaching as far down as the umbilicus, although gentle pressure emptied its contents into the duodenum. The ductus choledochus was narrowed, but not completely obliterated by a mass of cancerous glands.

Isolated dilatations of the hepatic ducts are observed when one or two ducts are obliterated or compressed. A case of this description is recorded under Observation No. XXXI. Sometimes there are developed in this way saccular hollow spaces, or cysts, which are closed on all sides, and filled partly with concretions that look as if they were imbedded in the hepatic parenchyma, and partly with a yellow viscid fluid. Their walls are, for the most part, very thick and dense. Cruveilhier (Livr. XII., Plate IV., Fig. 3) has figured a morbid appearance of this sort, but, unfortunately, without annexing any precise details of the history of the case. Ampulliform dilatations connected with the bile-ducts are particularly common in sheep affected with the Distoma hepaticum.

A general dilatation of the biliary passages occurs, where there is occlusion of the ductus choledochus. In such cases it is the large ducts, the ductus choledochus, and the hepatic duct, together with the gall-bladder, which suffer first and most severely. The branches in the interior of the liver do not become involved until a later period, owing to the resistance offered by the glandular tissue, preventing their dilatation. Under such circumstances the ductus choledochus may attain to an enormous size. A case of cancer of the duodenum and pancreas has already been mentioned in Vol. I., p. 97, 98, where the transverse diameter of the ductus communis measured 1½ inch, and its circumference 3 inches; while the hepatic duct was 22 Paris lines in breadth. At page 167 (Vol. I.) there is another observation of a case, where the hepatic duct measured 1 inch and 4 lines. These, however, are far from being the limits to which dilatation of the ducts may extend. Abraham Vater (*Dissertatio de Scirrhis Viscerum*, Vitemb. 1723) found the ductus communis, in the body of an atrophied infant, who died at the age of twelve months, completely occluded by an indurated pancreas, and distended beyond this obstruction into an enormous sac. Traffelmann (*Voigtel, Handb. d. path. Anat.*, Bd. III., s. 136) mentions an instance where the ductus choledochus was as capacious as the stomach, and filled with gall-stones.

An interesting preparation of this sort is preserved in the Anatomical Museum at Breslau. I was indebted for it to the kindness of my colleague, Barkow, who also made a very accurate drawing of the parts. The preparation consisted of the liver of a female who died in the St. Elizabeth Convent, from obliteration of the ductus choledochus. The liver measured 10½ inches from left to right, and 7½ inches from before backwards. The gall-bladder was of the ordinary breadth, and was 5 inches and 4 lines long. The body gradually became smaller towards the neck, so that, when slit up and laid out, its breadth at the narrow part was only 7 lines. This narrow portion of the body of the gall-bladder led into the neck, which being imperfectly separated from the end of the body by a valvular prominence 4 lines in height, and from the cystic duct by a similar projection, presented a pouch-like excavation, 1 inch and 5 lines in breadth.

The neck of the bladder passed into a large membranous sac, which, before it was opened, was thought to be an abscess, but was ascertained to consist of the greatly dilated ductus choledochus and cystic duct (Fig. 20). The length of this sac was 8 inches, and after it was slit open, and the thin greenish bile which it contained was evacuated, its breadth was 5 inches. The neck of the gall-bladder led into this large reservoir of bile, by an opening about 1½ inch wide, and the hepatic duct by an opening 4 lines in width (Fig. 21); the extremity of the reservoir reached as far as the duodenum, but was here completely blocked up. There was a slight elevation on the inner surface of the duodenum, at the place where the ductus choledochus usually opens; the opening of the pancreatic duct was pervious. The complete occlusion of the ductus choledochus, and the accumulation of bile resulting therefrom, had induced the enormous dilatation. No definite line of demarcation could be recognized between the ductus choledochus and the cystic duct; the dilatation had implicated both uniformly, and the site of their junction was only indicated by the orifice of the hepatic duct. The latter passed into a sac, filling up the fissure of the liver, and measuring 2½ inches in breadth, and here it sent off large branches through the liver.

The dilatation extends with greater or less rapidity from the large ducts to the branches of the hepatic duct within the liver, even as far as their radical extremities, which become enlarged either uniformly, or in the form of tubes with numerous saccular bulgings, permeating the glandular tissue in every direction.

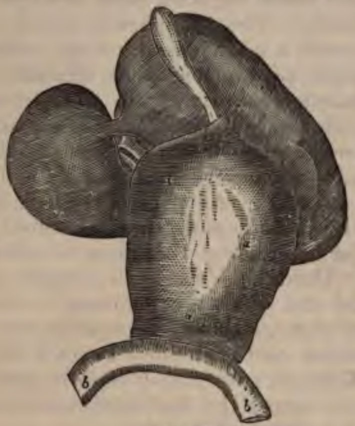

FIG. 20.

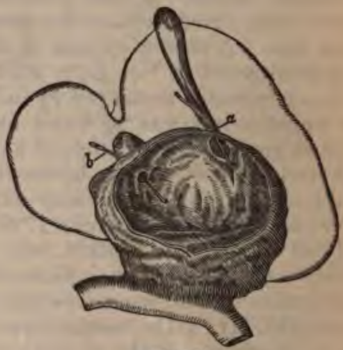

FIG. 21.

FIG. 20.—Enormous dilatation of the ductus choledochus consequent upon obstruction of its duodenal orifice. *a a a*, Sac of the ductus choledochus; *b b*, duodenum.

FIG. 21.—Shows the distended sac of the ductus choledochus, from the same case as Fig. 20, slit open. The neck of the gall-bladder is also slit open, and a probe (*a*) is passed from it into the sac of the ductus choledochus; *b* is a probe passed from the latter into the hepatic duct.

On examining fine sections of the dried gland with a moderate magnifying power, it is found that the dilated ducts for the most part reach only to the outer margin, and rarely penetrate to the central portion of the lobules; even there, close to their origin, they assume the form of wide, thick-walled tubes (Fig. 22). Not unfrequently several ducts are seen lying close together, and enveloped in a dense sheath of connective tissue.

The contents of the dilated bile-ducts consist, for the most part, of a thin bilious fluid, mixed with a greater or less quantity of puriform mucus. Sometimes they are more concentrated, and contain an abundance of crystalline plates of cholesterine, or rounded, angular, or occasionally tubular, concretions,[1] deposited from the stagnant secretion of the liver. In a case that occurred in my own practice (See Vol. I., p. 97, 98, Observation VI.), the bile-ducts only contained a colorless mucous fluid, without any trace of bile. Here the communication between the glandular tissue and the excretory passages must have been interrupted for a long period; the bile was absorbed, and the secretion of the mucous membrane took its place. This substitution occurs more frequently in the case of the gall-bladder, in the so-called "hydrops cystidis felleæ."

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[1] Cruveilhier has recorded a case in which there were tubular casts of the ducts (*Anat. Pathol. Génér.*, Tom. II., p. 835).

The dilatation of the bile-ducts always results in an atrophy of the adjacent glandular tissue. In the first place, however, the entire volume of the organ is enlarged; it is not until a later period, when, in consequence of the increasing pressure, the process of secretion is impaired, while that of absorption obtains the upper hand, that the gland becomes reduced in size, and assumes a flabby and shrivelled character. In many cases, the hepatic cells ultimately become destroyed, while the entire organ is softened, and death supervenes under symptoms of poisoning of the blood,[1] or ulcerative processes are developed on the mucous membrane of the ducts, which ultimately implicate the surrounding parenchyma, and entail all the consequences that we have already found to result from such ulcerations.

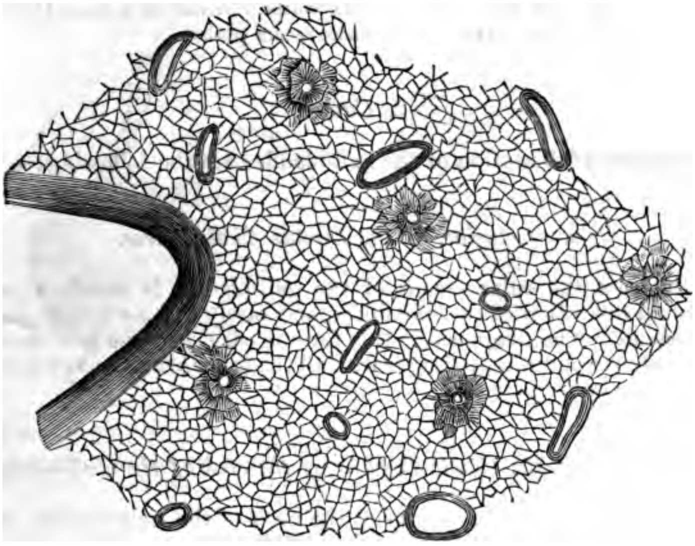

FIG. 22.—A thin section, magnified 80 diameters, of a liver in which the bile ducts were dilated, in consequence of a cancerous tumor in the head of the pancreas. The large empty spaces are the sections of the dilated bile-ducts, the walls of which are represented as much thickened. The smaller openings, surrounded by dark spaces, are the hepatic veins, the hepatic cells adjacent to which are loaded with bile-pigment. (The shading around these openings ought to have been of a more granular character.)

The symptoms, the progress, and the treatment of dilatation of the bile-ducts have already been discussed in detail in Vol. I. (p. 89 *et seq.*).

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[1] See Observation No. XIX., in Vol. I.

IV.—DILATATION OF THE GALL-BLADDER.—DROPSY OF THE GALL-BLADDER.

(*Hydrops Cystidis Felleæ.*)

1. *Anatomical Description.*

Of all parts of the excretory apparatus of the liver, the gall-bladder is the most frequently dilated. Sometimes it attains an enormous size, and forms a globular tumor, the diagnosis of which is not always an easy matter. The dilatation is in most cases uniform, the bladder retaining its usual form; on rare occasions we find appendices or diverticula, which have their seat at the fundus or neck, and which usually owe their origin to the presence of gall-stones.[1] The size of the gall-bladder may increase to that of a goose-egg, or even a child's-head; it may contain one, two, or several pounds of fluid;[2] and it may extend as far as five inches beyond the margin of the liver. At the same time its walls become, as a rule, thickened, and occasionally also covered with calcareous plates.

2. *Causes.*

The causes of dilatation of the gall-bladder are the following:—

a. Occlusion of the Ductus Choledochus.

In this case the enlargement of the gall-bladder is merely a part of the general dilatation of the bile-ducts, and rarely attains a high grade of development. The diagnosis of this form is easy, because it is accompanied by intense jaundice, together with all the other symptoms of occlusion of the ductus choledochus.

b. Occlusion of the Cystic Duct or of the neck of the Gall-bladder.

Occlusion of the cystic duct or of the neck of the gall-bladder may be due to gall-stones or inflammation, the latter cause not unfrequently leading to firm obliteration. The rest of the biliary passages are usually unimplicated; the flow of bile into the intestine meets with no obstruction; and hence enlargement of the liver and likewise jaundice are completely absent.

When the occlusion of the neck of the gall-bladder is produced by a gall-stone, it occasionally happens that the concretion acts in the manner of a valve, permitting the entrance of bile into the gall-bladder, but preventing its egress. Under such circumstances the bladder sometimes attains to an enormous volume.

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[1] Bouisson has described a pouch-like appendix to a dilated gall-bladder, which was formed merely by the external coat, the mucous membrane at the opening of the diverticulum being destroyed. No concretions were found (*De la Bile*, Montpellier, 1843, p. 136).

[2] Van Swieten found eight pounds of thick bile in the gall-bladder. Cline drew off twenty ounces with the trocar. Benson has recorded a case, where the gall-bladder was so greatly distended, that, on the mistaken supposition that the swelling was due to ascites, paracentesis was performed, and two quarts of bile were drawn off. The largest quantity of fluid that I have found in the gall-bladder was eighteen ounces.

In a lady, 34 years of age, who had suffered from repeated attacks of colic from gall-stones, a semi-globular tumor, extremely tender on pressure, was developed at the margin of the liver, close to the rectus muscle, amid symptoms of acute fever. This tumor increased both in length and breadth, and after some weeks it extended downwards 1½ inch below the crest of the ilium, and caused the abdominal parietes to bulge forwards, so that the boundaries of the elongated tumor could be seen on simple inspection. The appetite failed entirely; vomiting supervened from time to time, and for several days recurred after every meal; the bowels were confined, but the stools were brown; great emaciation; the skin presented a faint-yellow tint, while the urine sometimes contained bile-pigment, and at other times was free from it. On palpation it was ascertained that the abdominal parietes could not be moved over the surface of the tumor. No change occurred in the situation of the tumor, according to the posture of the patient. From these characters it was assumed that adhesions existed, and as fears were entertained, from its rapid growth, that the tumor would rupture, it was resolved to tap it. A very considerable quantity of brown bile, mixed with puriform mucus, was drawn off. The painful tension diminished; the fever abated; and the appetite returned. The discharge of bile continued for three weeks; it then gradually became reduced in quantity and of a more mucous character, until at last the opening cicatrized. The patient recovered completely.

Sometimes the dilatation of the gall-bladder suddenly disappears, owing to the calculus blocking up its neck, and afterwards the bile, finding their way into the bowel. Thus Pétit (*Mémoires de l'Académie de Chirurgie*, 1743, Vol. I., p. 181) mentions a case where a tumor, which he was proceeding to open, on the supposition that it was an hepatic abscess, suddenly disappeared during the operation, and the patient immediately afterwards passed a large quantity of bile with the stools. Usually, however, the gall-bladder becomes distended again, as it can only be imperfectly emptied of bile, in consequence of the atony of its muscular tissue.

When the occlusion of the neck of the gall-bladder is more complete, owing to the impaction of a gall-stone, or when the neck is obliterated from inflammation, cancer, &c., the admission of bile into the gall-bladder ceases, while the isolated remnant of bile is gradually absorbed, and its place is supplied by the secretion from the walls of the gall-bladder which is sometimes of a mucous character resembling synovia, and at other times of a serous nature, according as it is mixed with the secretion of the mucous glands of the distended wall, or as the mucous membrane, in consequence of the distention, has assumed more of the character of a serous membrane.[1] Ultimately, not a trace of bile remains. Under such circum-

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[1] The fluid, which I have examined, was feebly alkaline, transparent, and mingled with white flakes. The flakes did not consist of the epithelium of the gall-bladder, but of rounded mucous corpuscles, which were partly united into membranous masses. Bile-pigment and the biliary acids were absent; on the addition of nitric acid, a faint turbidity was developed; acetic acid rendered the fluid thick and gelatinous. The composition in 100 parts was as follows:—Water, 98·27, and solid constituents 1·73. Of the solids, there was 1·60 per cent. of organic matter, mucus, &c., 0·06 per cent. of alkalies, and 0·07 per cent. of earthy matter. In another case albumen was present in larger quantity.

The fluid of the dropsical gall-bladder was first carefully examined by Bernard stances, the gall-bladder may be very large; but, as a rule, its growth gradually ceases, owing to the secretion from the mucous surface diminishing, in consequence of the increased pressure, and the tumor either remains stationary, or after a time is reduced in size. The painful tension that accompanies the development of dilatation of the gall-bladder then disappears, and the tumor may exist for a long time without causing much uneasiness.

A case of this nature, which I have selected out of several others that have come under my observation, may be recorded here, on account of its simplicity.

OBSERVATION No. XXXIV.

Pains in the Right Hypochondrium.—Slight Fever.—Smooth pear-shaped Tumor in the region of the Gall-bladder.—Cessation of the Fever and Pains, after the employment of local Antiphlogistics, but no alteration of Tumor.

Henriette Fröhlich, aged 60, a cook, came to the Medical Clinque at Breslau on May 3d, 1856. She had always enjoyed good health prior to the 1st of May, when she was seized with rigors, and acute pains in the right side; at the same time she complained of loss of appetite and nausea, and the bowels were confined. At the margin of the liver, close to the external border of the rectus abdominis muscle, there could be felt a tense, perfectly smooth, pear-shaped tumor, which ascended and descended with the liver, and which was very tender upon pressure. It extended about 2½ inches beyond the margin of the gland. The size of the liver, as well as of the spleen, was normal; neither the skin nor the urine presented a jaundiced tint; the bowels were freely moved after the administration of Sulphate of Magnesia, and the stools were tinged brown. After the employment of leeches, mercurial ointment, and cataplasms, the pains ceased entirely at the end of six days; the tumor became softer, and the appetite returned. Four weeks afterwards, no change had taken place in the tumor, and the patient was discharged, as she complained of nothing.

The mode of termination, however, is not always so favorable as in the above case. When gall-stones are present, or even independently of them, ulcerations may be developed in the isolated gall-bladder, and induce death from perforation, or from the formation of metastatic deposits, or from hectic fever.

An observation recorded by W. Pepper (*American Journal*, Jan., 1857) is worthy of notice in this respect. The case was that of a man, 26 years of age, who came under treatment on January 7th, 1856, complaining of pains in the region of the liver. In the preceding August he had passed through an attack of bilious fever, and had taken mercury for it, until salivation was produced; from that time he had experienced a gradually increasing pain in the right hypochondrium. A hard tumor was felt in this locality, which grew slowly, became more and more elastic, but exhibited

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(*Spec. Inaugur. sistens Quæst. Medic. Argum.* Lugduni Batav., 1796); but it was long ago described by Glisson (*Anat. Hepatis*, Cap. 39), and by De Graaf (*Tractat. de Succo Pancreatico*, Cap. 8). W. Pepper found a large quantity of purulent fluid mixed with fibrinous flakes in an occluded gall-bladder (*American Journal*, Jan., 1857).

no fluctuation. In addition to this painful tumor, there was emaciation, diarrhœa, and hectic fever, but no jaundice. Steel and Quinine were prescribed.

By the middle of March the tumor extended as far as the crest of the ilium, and was distinctly fluctuating. An exploratory needle was introduced without any result, but two or three ounces of muco-purulent fluid were drawn off by the trocar; the pain and tension abated for a time. Caustic Potash was applied in order to induce adhesions; soon afterwards the tumor yielded a tympanitic sound on percussion, the diarrhœa increased, the strength failed, and death ensued on April 19th.

Autopsy.

The liver was not enlarged; the right lobe contained two small abscesses; the remaining hepatic tissue was normal; the hepatic duct and the ductus choledochus were pervious. The gall-bladder was enormously distended, and discharged a fetid gas when punctured; it contained two quarts of a yellow, purulent fluid, which was mixed with fibrinous flakes and bile. Its walls were ¼ inch thick superiorly, but at the lower part they were very thin and easily torn; the mucous membrane was here ulcerated; the cystic duct was completely closed up by false membranes; the gall-bladder was nowhere adherent. All the remaining organs were normal. No gall-stones were present.

The inflammation of the gall-bladder originated in the bilious fever, as it did in Abdominal Typhus in Observation No. XXXIII. The cystic duct became closed at an early stage, and the products of the advancing inflammation gradually distended the gall-bladder into a large tumor, the real nature of which was only recognized after death. The continued suppuration induced hectic fever. The operation of tapping was followed by development of gas, in consequence of the putrid decomposition of the contents of the gall-bladder; this of course embarrassed the diagnosis. The abscesses in the liver were, apparently, of a metastatic nature, resulting from ulceration of the mucous membrane of the gall-bladder. The long duration of the inflammation, independently of the action of any fresh exciting cause after the termination of the bilious fever, was remarkable. An evacuation of the contents of the gall-bladder, by means of puncture, performed at the right time and with the necessary precautions, would have been the only way of arresting the disease.

3. *Diagnosis.*

The distention of the gall-bladder by means of bilious, mucous, or purulent fluid is sometimes difficult to diagnose in practice, or to distinguish from other morbid conditions. Of course we can usually recognize the gall-bladder by the situation of the tumor, particularly when the margin of the liver can be felt and serves as a guide; but it must not be forgotten that this situation is changed by displacement of the liver, and, moreover, that it varies according as the right or left lobe is more developed, so that cases occur where the gall-bladder is found in the linea alba, or close to the linea axillaris. The smaller dilatations of the gall-bladder are often overlooked, and are felt with difficulty, unless the hand be cautiously applied. When strong or rapid pressure is used, the tumor evades detection.

But every semi-globular or pear-shaped tumor that is felt at the margin of the liver, must not at once be put down as an enlarged gall-bladder. Echinococci, abscesses of the liver, cancerous tumors of the liver and of the gall-bladder, may give rise to similar prominences, and may, therefore, occasion errors in diagnosis. Independently of the hydatid vibration and the absence of pain, hydatids of the liver are usually distinguished by the broader base, by which they are firmly attached to the liver; while, on the other hand, the gall-bladder is pear-shaped, and evades pressure. There are, however, exceptions; it has already been shown in the chapter on Hydatids, that hydatid tumors may exist in the liver, presenting the form of the gall-bladder; such an hydatid tumor is figured at p. 16.

The mode of development of abscesses of the liver differs from that of distention of the gall-bladder; they form at first hard, and afterwards soft, tumors; the derangements of the general health are more intense; and their form is different, being much broader.

Cancer of the liver and gall-bladder can only occasion mistakes in diagnosis, when soft medullary cancers grow from the lower margin of the gland. They are usually distinguished with ease by their uneven surface, their greater resistance, their broader base, by the presence of nodules on the other parts of the liver, and by the symptoms of the cancerous cachexia.

When it has been decided that the tumor is the gall-bladder, it is impossible to determine with certainty whether it contains bile or mucus, or a purulent fluid. When there is no jaundice it is probable that the fluid is of a mucous or purulent character; but when the intumescence of the gall-bladder is accompanied by jaundice it may be expected to be bile. But to both these statements there are exceptions; dropsy of the gall-bladder may exist in consequence of closure of the neck of the bladder, in cases where the ductus communis is likewise occluded; and it has already been shown that the gall-bladder is sometimes found distended with bile, although there is no jaundice.

4. *Treatment.*

Treatment is of little avail against the morbid condition under consideration. As long as inflammatory symptoms are observable they must be combated by local abstractions of blood, mercurial ointment, warm cataplasms, rest, a rigid diet, and saline purgatives; but, when symptoms of impaction of a gall-stone appear, we must endeavor to facilitate the passage of the concretion by narcotics, warm baths, &c. By such measures we may sometimes succeed in preventing inflammatory obliteration of the neck of the gall-bladder, or its closure by a concretion; when either of these accidents has already occurred our treatment can only be directed against symptoms.

We must never think of evacuating the contents by means of puncture, except when the rapid increase of the tumor endangers the rupture of the gall-bladder, or when symptoms of hectic consumption supervene. When there are adhesions the operation may be had recourse to without hesitation; but when there are no adhesions, or their existence is doubtful, the same precautions must be observed in making the opening, as have already been shown to be necessary in opening abscesses and hydatid tumors of the liver (See Vol. II., p. 157, and p. 23 of this Vol.).

V.—Morbid Growths of the Biliary Passages.

In addition to tubercle, with which the mucous membrane of the biliary passages is sometimes infiltrated, and the circumstances of which require further investigation, cancer is particularly common as a new formation in this locality.

Cancer of the bile-ducts is usually secondary to cancer of the liver; the disease being propagated from the glandular tissue to the ducts. The ducts are either destroyed, or flat nodules are developed upon the mucous membrane of the larger ducts, which extend and grow in an exuberant manner (see Chapter on Cancer of the Liver).

Cases, however, do occur of primary cancer of the excretory apparatus of the liver; this primary form is most common in the gall-bladder, and in the ductus choledochus. In structure, it either corresponds with that of the simple cancer of the gland, the medullary or scirrhous form, or it is referrible to the cauliflower vegetations, the villous cancer of Rokitansky.

Simple cancer of the gall-bladder is most common in old persons; I have seen one case in a man, aged 73. Durand-Fardel (*Krankheiten des Greisenalters, deutsch von Ullmann*, Würzburg, 1858, s. 920) has collected six observations, in all of which the age varied from 71 to 81 years. Markham, however, has recorded a case of primary cancer of the gall-bladder, in a female aged 28 (*Transactions of the Path. Society*, Vol. VIII).

The disease usually commences in the submucous tissue of the gall-bladder. Nodules are developed here which gradually encroach upon the mucous membrane, and, on the other side, implicate the muscular and serous coats. The wall of the gall-bladder is considerably thickened; its outer surface becomes uneven, and the cavity is often completely filled with cancerous matter. Not unfrequently the cancerous masses growing into the cavity of the gall-bladder undergo disintegration; ulcers are formed: and an ichorous fluid accumulates in the bladder. Concretions are very commonly found in the bladder in addition to the cancer; out of eleven observations they were present in nine.

Externally the cancerous gall-bladder contracts adhesions to the surrounding parts, more particularly to the transverse colon, and by a continuance of the ulceration a communication may be established between the two. Durand-Fardel, and likewise Murchison (*Transactions of the Path. Society*, Vol. VIII., p. 228) have published observations of this nature.

Villous cancer of the gall-bladder[1] is met with chiefly on the anterior wall, where it is sometimes pedunculated, while, at other times, it springs by a broad base from the submucous tissue. In the case of the more recent formations of this nature, the mucous membrane looks as if it were covered with white velvet, but in the older growths it presents a cauliflower appearance. The framework of this cancer is formed by long excrescences, partly branched like a tree and nodulated, which consist of connective tissue and contain numerous large blood-vessels. These excrescences are covered with cylindrical epithelium, or rounded cells, by which they are united at some places into thick masses. Fatty degeneration of the cells and of the stroma is occasionally observed. The wall of the gall-bladder, from which the cancer grows, is thickened and transformed into a dense or areolar matrix, infiltrated with cancer-juice. The interior of the gall-bladder contains a creamy yellow or reddish fluid, in which epithelium cells and oil-globules exist in great quantity.

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[1] See Heschl., *Wiener Zeitschrift*, Bd. VIII., s. 9, 1852; Klob, *Wiener Wochenbl.*, No. 46, 1856.

Villous cancer is either primary or it supervenes upon cancerous deposits in other parts of the body. As in the first form of cancer, ulceration of the villous growth may lead to destruction of the gall-bladder, and spread to the neighboring parts, particularly the colon and the duodenum, or it may end in perforation and give rise to general peritonitis.

The symptoms of cancer of the gall-bladder are not very marked. The most important and constant of them is the painful globular tumor, which is in most cases hard and uneven, and which can be felt in the situation of the gall-bladder. All the remaining symptoms are of a very indefinite character; jaundice in most cases is absent; gastric derangements are more common. Durand-Fardel observed persistent vomiting and diarrhœa in one case, where a rupture had taken place into the colon; the termination of the disease is usually accompanied by emaciation and the ordinary symptoms of the cancerous marasmus.

A certain diagnosis is only possible when the situation and form of the tumor formed by the gall-bladder can be recognized; this is only difficult, when the gall-bladder extends but a short way beyond the margin of the liver, or is covered by the ribs.

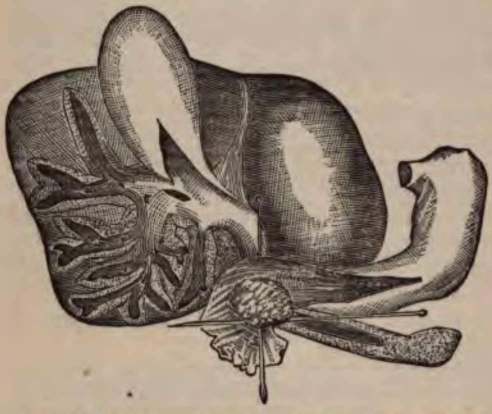

FIG. 23.—Cancerous tumor, growing into the duodenum and producing complete obliteration of the ductus choledochus, with consequent dilatation of the pancreatic and biliary ducts. (See Observ. No. VI., Vol. I., p. 196.)

The treatment is the same as that for cancer of the liver.

Simple as well as villous cancer may occur in the ductus choledochus, particularly towards the duodenal end. It may be independent of similar morbid growths of the intestine and pancreas, which, however, are very apt to involve this duct.

Cases of this nature are recorded in Volume I. (Observations Nos. V. and VI.), which terminated fatally under symptoms of obstruction to the flow of bile. In the annexed woodcut (Fig. 23), a lobulated tumor, the size of a walnut, is observed projecting from the orifice of the ductus choledochus into the duodenum.[1]

Morbid growths of this description cannot be recognized during life, as they completely elude palpation; but, like obliteration of the common duct, they give rise to symptoms of obstructed excretion of bile, terminating in death.

VI.—FOREIGN BODIES IN THE BILIARY PASSAGES.

As a rule the foreign bodies found in the biliary passages are concretions formed out of the elements of the bile; in rare cases, they are entozoa, which either have their habitat in this locality, such as the Distoma hepaticum, or which gain access to the ducts under exceptional circumstances, such as Hydatids and Round Worms.

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[1] See further, Lambl, *Archiv f. Pathol. Anat.*, Bd. VIII., s. 133.

A. Round Worms in the Biliary Passages.

Ascaris lumbricoides.

Round worms in their wanderings sometimes enter the ductus choledochus, and pass by this into the gall-bladder, or to the terminal branches of the hepatic ducts, giving rise to numerous derangements. On the whole, this is a rare occurrence, although thirty-seven examples have already been recorded in medical literature.[1]

In the first place, worms have been found in the entrance of the ductus choledochus, hanging partly into the duodenum, without any signs of inflammation, or of obstruction to the flow of bile having been observed during life, or on *post-mortem* examination.[2]

In these cases it must be assumed that the worms did not enter the bile-ducts until shortly before death.

In other cases symptoms of irritation of the bile-ducts and of obstruction to the flow of bile occurred during life.

Thus Lieutaud[3] records the history of a boy, aged 14, who was attacked with fever, painful distention of the epigastrium and of the region of the liver, together with salivation and jaundice; the stools lost their color, the pulse became intermittent, and death took place amidst convulsions. The liver was found to be yellow and enlarged; the gall-bladder was distended with bile, and the ductus communis was blocked up by a large round worm, while large numbers of similar worms were found in the stomach and intestinal canal. Buonaparte of Pisa[4] also has recorded a fatal case of jaundice, the cause of which was ascertained to be a round worm in the ductus choledochus.

The ascaris lumbricoides is met with in the gall-bladder and in the hepatic duct, as well as in the branches of this duct in the interior of the liver, more frequently than in the ductus communis. The worms are sometimes found in large numbers[5] in these situations, and they give rise to obstruction to the flow of bile, and to dilatation, catarrhal or exudative inflammation, and occasionally also to ulceration of the ducts, and to abscesses of the liver, while, in exceptional cases, they die and shrivel up and form the nuclei of gall-stones.

Lorry[6] found three large round worms in the gall-bladder of a maniac, who suffered from convulsions and vomited a worm of the same sort shortly before death. Single worms have also been found in this locality by Bloch and Heaveside.

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[1] See C. Davaine, *Traité des Entozoaires*, Paris, 1860, p. 156.

[2] Tonnelé, *Réflexions et Observations sur les Accidents produits par les vers lombrics. Journ. Hebdom.*, Paris, 1829, T. IV., No. 47, p. 292; Hayner in *Rudolphi Synopsis;* Röderer and Wagler, *Tractatus de Morbo Mucoso*, Sect. IV., Göttingen, 1762.

[3] *Historia Anatomico-Medica*, Observ. 907. Parisiis, 1767, T. I., p. 210.

[4] Brera, *Memor. Fisico-med. sopra i princip. Vermi del Corp. Umano*, 1811, p. 207.

[5] Hayner (*Nasse's Zeitschrift für psychische Aerzte*, Bd. I., 4, s. 514–520; *Rudolphi Synopsis*, p. 626) found seven worms in the greatly dilated ducts of the liver, and one in the ductus choledochus.

[6] *De Melancholia et Morbis Melancholicis*, *Comment.* Lips., T. IV., p. 664.

Cruveilhier[1] met with two round worms at the point of subdivision of the hepatic duct, and two others in its ramifications, in the body of a woman who died of an attack of pneumonia. There was no lesion of the liver, and no symptom to indicate, during life, the presence of these strangers in the bile-ducts.

Guersant[2] publishes the history of the case of a child who suffered from slight attacks of colic, and died suddenly of convulsions. The autopsy disclosed no other lesion, with the exception of two round worms, 7 or 8 inches long, in the hepatic duct and its branches.

At the autopsy of a soldier, who had suffered from pains in the epigastrium and in the region of the liver, violent febrile symptoms, great restlessness, jaundice, convulsions, &c., and who died on the fifteenth day of his illness, Broussais[3] found the liver swollen and congested; while a very large round worm was impacted in the common duct, and a smaller one in its branches.

Cases occur where round worms in the ductus choledochus are followed by a rupture of the duct. There is a preparation of this sort in the collection at Vienna, and other cases have been recorded by Fontanelles[4] and Lorrentini.[5]

Specimens of the ascaris lumbricoides are sometimes found in rounded cavities in the interior of the liver, with walls, that sometimes appear smooth and free from pus, but at other times are rough and ulcerated. These cavities are produced by partial dilatations of the ducts; the worms lie coiled up in their interior. Laennec[6] has published an observation of this nature, where the patient was a child 2½ years of age. The bile-ducts were greatly dilated and filled with worms, but were free from bile; their lining membrane was at some places much reddened, and at others ulcerated and completely destroyed, so that the worms were in direct contact with the glandular tissue. Several of the cavities formed in this way were as large as an almond.

It is often a difficult matter to prove the connection of these cavities with the bile-ducts, owing to the latter being constricted or blocked up, so that no communication appears to exist between the two. Pus then accumulates in the cavities, whilst it finds a ready exit when the ducts are pervious.

Allusion has already been made at p. 136, Vol. II., to the abscesses of the liver which are produced by the penetration of round worms, and references have been given to the most important cases on record.

One of the rarest observations on record is that of Lobstein,[7] who found a round worm forming the nucleus of a gall-stone situated in the ductus choledochus of a female, 50 years of age. This calculus was pear-shaped, and with its base firmly closed up the duodenal opening of the duct. The hepatic duct and its branches were filled with worms.

How the worms gain admittance to the biliary passages is a question to which it is difficult to give a definite answer.

The *naïve* opinion expressed by G. Wierus,[8] that the worms are compelled to enter the narrow bile-ducts for want of food, will certainly meet with little credit at the present day. There is far more probability in the view expressed by Devaine, according to whom, sufficient room is made for the worms by the dilatation of the ductus communis, consequent on the passage of a gall-stone or an hydatid vesicle. There can be no doubt that in some cases the worms have been accompanied by concretions, whilst in the observation recorded by Roederer and Wagler an hydatid sac was found in one of the dilated bile-ducts; but still numerous cases of children remain, where there have been no grounds for either of the above assumptions, and where there have been no symptoms of any previous affection of the biliary passages.

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[1] *Dictionn. de Médic. et Chirurg.*, Art. "Entozoaires," p. 340.

[2] *Dictionn. de Méd.*, 1828, T. XVI., p. 244.

[3] *Histoire des Phlegmasies Chroniques*, Paris, 1826, T. III., p. 272, 4 Edit.

[4] *Revue Médicale*, Sept., 1835.

[5] Guersant, *loc. cit.*

[6] *Diction. des Sciences Médic.*, Art. "Ascarides," p. 344.

[7] *Catalogue du Musée Anatomique de Strasbourg*, No. 1987.

[8] *Epistola ad fabr. Hildanum.* Dusseldorpii, 1602.

The symptoms that accompany the presence of round worms in the excretory apparatus of the liver are very various; hitherto, they have not sufficed in any case for forming a certain diagnosis. In some cases there have been no symptoms whatever of any affection of the liver; but in most there have been the symptoms of obstructed flow of bile,—jaundice and decolorized stools, accompanied by severe pains in the epigastrium and right hypochondrium, and often also by vomiting and convulsions. The last-mentioned symptom has been noticed by Lorry, Broussais, Guersant, and others. As no other cause could be found on *post-mortem* examination, to account for the convulsions, they must be regarded as of a reflex nature, and induced by the irritation of the branches of the hepatic plexus. In cases where hepatitis supervened, there were all the symptoms of this affection.

It is still undecided whether recovery is possible. At all events, the observation of Schloss,[1] in which jaundice disappeared suddenly after the discharge of a worm, is by no means sufficient to settle this question in the affirmative. The observation of Kirkland[2] is more to the point. In this case an abscess opened at the margin of the false ribs on the right side, and discharged a large quantity of pus together with a round worm. A biliary fistula remained, proving that the worm came from the bile-ducts, and showing that a cure, although an imperfect one, was the result.

Considering the uncertainty of the diagnosis, all that can be done in the way of treatment, is to combat the different symptoms as they arise.[3]

B. HYDATIDS IN THE BILIARY PASSAGES.

(See p. 137, Vol. II., and this Vol., p. 9.)

C. DISTOMA HEPATICUM AND DISTOMA LANCEOLATUM.

Liver-fluke, Liver-leech. (*Leberegel.*)

The distomata are smooth, soft, oval, yellowish-white flattened worms, with two sucking discs, one of which is situated at the pointed head-extremity, and forms a funnel-shaped depression, leading to the oral orifice, while the other is situated on the abdomen, and terminates by a blind concavity. The opening of the sexual organs lies between the two discs; the animals are hermaphrodite. The Distoma hepaticum, in its fully-grown condition, measures from 8 to 14 lines in length, and from 3 to 6 lines in breadth, and is furnished with a branched intestinal canal. The Distoma lanceolatum is from 2 to 6 lines long, and from 1 to 2 lines broad; its intestinal canal is divided in a furcate manner, and the female genital organs are for the most part situated in the posterior part of the body, while those of the Distoma hepaticum are in the anterior portion. The two animals belong to different species, which must not be confounded with one another, as has been done by Zeder and Bremser.

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[1] *Bulletin de la Société Anatomique*, Paris, 1856, p. 361.

[2] Richter's *Chirurgische. Bibliothek*, Bd. X., s. 605.

[3] It is still doubtful whether tapeworms can penetrate into the biliary passages. Jonas found tapeworms in the liver of a rat; and Morau has recorded a case where jaundice recurred every second week, was accompanied by painful enlargement of the liver, and was only permanently cured after the discharge of tapeworms. (Fauconneau-Dufresne, *L'Affection Calculeuse du Foie*, p. 377.) See also Observation No. XLIII.

The distomata have their habitat in the biliary passages of the Ruminantia, and particularly of sheep, among which they often commit great devastation. They are very rarely found in the human body, and the number of recorded cases is small.

Among the earlier physicians, Borel, Malpighi,[1] and Bidloo,[2] make mention of distomata in the human liver, but without recording any precise observations. We are indebted for the first positive observation of distomata in the human body to Pallas,[3] who found them in the bile-ducts of a female who died at Berlin. In 1790, Buchholz[4] discovered them in the gall-bladder of a criminal, whose death resulted from an attack of putrid fever; the preparations were afterwards examined by Rudolphi and Bremser. In 1804 Fortassin met with two distomata in the bile-ducts of a man. Brera[5] has recorded a case, where the patient was affected with scorbutus and dropsy; the liver in this case was dense and large; its interior was filled with distomata, which were partly isolated, and partly accumulated in large numbers in the glandular tissue.

Careful details of the symptoms of the disease have been published by P. Frank,[6] who, on dissecting the body of a girl, 8 years of age, found five greenish-yellow, living, smooth worms, the length of a silkworm, in a pouch-like dilatation of the hepatic duct. The patient was admitted into the Hospital at Mailand in November, 1782, in a state of extreme exhaustion and emaciation; her abdomen was distended, and for six months she had suffered from diarrhœa, with violent pains in the hepatic region; there was no trace of jaundice; death was preceded by convulsions.

Partridge discovered a solitary distoma in the gall-bladder of a dead body dissected in the Middlesex Hospital at London, which Owen, who examined it, declared to agree in every respect with the Distoma hepaticum of the sheep.

The above are the few observations of distomata in the biliary passages of the human subject. To them may be added several cases, where liver-flukes were found in the intestinal canal, to which they had probably passed from the liver. Rudolphi[7] mentions small distomata, which Chabert succeeded in expelling from the bowel by means of his empyreumatic oil.[8]

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[1] *Opera Posthuma*, Lond., 1697, p. 84:—"In hepate frequentes occurrunt vermes cucurbitini in homine et brutis, præsertim in bove."

[2] *Dissertatio de Animalculis in Ovino, aliorumque animantium Hepate detectis.*

[3] *Dissertatio de Infestis Viventibus intra Viventia.* Lugduni, Batav., 1760, p. 5.

[4] Joerdan's *Entom. und Helminthologie des menschl. Körpers*, 1802, s. 65.

[5] *Loc. cit.*, p. 94.

[6] *De curandis Hominum Morbis Epitome*, T. V.

[7] *Historia Naturalis Entozoorum*, T. I., p. 327, and T. II., p. 356.

[8] Chabert's Bandwurmöl, or *Oleum Chaberti contra Tæniam*, is obtained by the distillation of twelve ounces of oil of turpentine mixed with four ounces of the *Oleum Animale Fœtidum*, which is the crude oil obtained from hartshorn and animal bones. —TRANSL.

Mehlis [1] describes in detail the clinical history of a widow at Clausthal, aged 31, who vomited the Distoma hepaticum, and subsequently the Distoma lanceolatum. The distomata were vomited along with coagulated blood, during repeated attacks of syncope; and after each attack, some flukes were voided by stool. At the same time there was distention and tenderness of the hypochondria, and dyspnœa with various hysterical symptoms; the color of the complexion was occasionally yellowish; but the nutrition and digestion remained undisturbed. After a violent attack of vomiting, by means of which several specimens of the Distoma hepaticum and about 50 specimens of the Distoma lanceolatum were discharged along with coagulated blood and a membranous substance, the patient began to improve. It is worth observing that Mehlis was never present when the flukes were vomited, and that, therefore, it is possible that the physician was the victim of deception by an hysterical female.

In 1843 Busk found fourteen distomata in the duodenum of a lascar, who died in the "Dreadnought." They were thicker and larger than those of the sheep, varying from 1½ to nearly 3 inches in length, but in their structure they resembled the Distoma lanceolatum, the intestinal canal being divided in a furcate manner, and the uterus being situated in the posterior portion of the body.

As to the symptoms which distomata give rise to in the human subject, little that is positive can be derived from the observations hitherto recorded. In sheep, their presence occasions dilatation and catarrh of the biliary passages, accompanied by atrophy of the hepatic tissue; jaundice rarely shows itself, and then only lasts a short time; ultimately a condition of anæmia is developed.

In the case of the human subject, the diagnosis of distomata could only be arrived at when they were ejected by vomiting, or with the stools.

The etiology of distomata is still obscure. They probably enter the intestinal canal as cercariæ, and pass thence into the biliary passages. According to the observation of Giesker and Frey,[2] they may also penetrate directly into the skin and undergo development in the subcutaneous cellular tissue. Giesker, for example, found two animals in the interior of a tumor on the sole of the foot of a female, which Frey and Von Siebold recognized as the Distoma hepaticum. In all probability the cercariæ had entered the sole of this woman's foot while she was bathing in stagnant portions of the lake at Zürich.

This observation is as yet a solitary one,[3] as is likewise that recorded by Duval,[4] who, in making an anatomical demonstration, accidentally discovered five large distomata in the interior of the portal vein. They were situated in the fluid blood of the trunk and hepatic branches of the portal vein; none were found in the abdominal roots of the vein. The walls of the vessel appeared free from every trace of inflammation or erosion; the liver likewise presented nothing abnormal. No information could be obtained respecting the man's history.

This case has frequently been doubted, and the opinion has been expressed that the distomata passed from the hepatic ducts into the veins; but, as Giesker and Frey have observed, there is the less foundation for this doubt, as Duval found the wall of the vein and the bile-ducts unaltered.

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[1] *Observat. Anatom. de Distomate Hepatico et Lanceolato*, Göttingen, 1825, p. 6.

[2] *Mittheil. der naturforsch. Gesellschaft in Zürich*, 1850, Bd. II., s. 89.

[3] Two other cases are recorded in the Appendix to the English Translation of Küchenmeister's *Animal and Vegetable Parasites*. In one the Distoma hepaticum was found in a cyst behind the ear of a sailor, aged 39; in the other it was found in abscesses on the head of a boy, 25 months old. There were some doubts as to the authenticity of the latter case.—TRANSL.

[4] *Gaz. Méd. de Paris*, 1842, T. X., p. 769.

Considering the uncertainty of the diagnosis, scarcely anything can be said as regards the treatment. When the animals are discharged, either by the mouth or anus, we may have recourse to anthelmintics, according to Chabert's process. (See p. 184, *note*).

To the Distoma hepaticum of the biliary passages we may add the Distoma hæmatobium, which was observed by Bilharz, in the portal vein and its branches, and likewise in the walls of the urinary bladder, but which hitherto has been found only in Egypt. In that country it is of very frequent occurrence; Griesinger[1] met with it 117 times out of 363 autopsies. In the larger vessels this distoma gives rise to no derangements, such as result when it exists in the capillaries and in the mucous membranes, and more particularly in the lining membrane of the urinary passages and the intestinal canal, where it induces hæmorrhage and inflammation.

The entire trunk of the portal vein is sometimes filled with these animals, while their ova are found in the tissue of the liver.

The Distoma hæmatobium is bisexual. The body of the male is thread-shaped, round, white, and flattened anteriorly. The oval sucker is triangular; the abdominal sucker at the end of the trunk[2] is circular. Below this, at the curved margin of the abdomen, a furrowed canal is found, which is intended for the reception of the female. The genital pore lies between the abdominal sucker and the commencement of the *canalis gynæcophorus.* The female is very thin and delicate; its tail is provided with no canal; the suckers resemble those in the male; the genital pore and the abdominal sucker are in contact. The length of the animal amounts to 3 or 4 lines; the male is broader than the female.[3]

The symptoms to which the Distoma hæmatobium gives rise during life, are more referrible to the urinary organs than to the liver. The urine is bloody, and sometimes contains the ova of the distomata; at the same time, a state of profound cachexia manifests itself.

Lastly, it may be here mentioned that Gubler[4] has found in the human liver bodies resembling the ova of entozoa, which are so frequently met with in the liver of rabbits. This is an observation which deserves to be further investigated.

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[1] *Archiv f. Physiol. Heilk.*, Bd. XIII., s. 554. *Zeitschrift f. wissenschaftl. Zoologie*, 1853, s. 55.

[2] The trunk (*Rumpfe*, *Truncus*) comprises merely the anterior eighth, or ninth part of the animal; the rest is the tail (*Cauda*).—TRANSL.

[3] From the above description it would seem that the *Distoma hæmatobium* is generically distinct from ordinary flukes. Kölliker, indeed, discovered a distoma (*D. Okenii*) in which the sexes are separate; but the presence of a gynæcophorous canal in the male of *D. hæmatobium* is peculiarly distinctive. No wonder, therefore, that we find helminthologists describing the latter worm under other titles. Thus Diesing, of Vienna, frames for it the genus *Gynæcophorus* (*Revis. der Myzelminth*, p. 52); Weinland, of Frankfort, describes it under the generic title of *Schistosoma* (*Essay on Tapeworms*, p. 87); and Cobbold, in this country, names it *Bilharzia hæmatobium*, in honor of its distinguished discoverer (*Synops. Dist. in Linn. Proc.* Zool. Div., Vol. V., p. 31). The last-named observer has found a second species of this singular genus (*Bilharzia magna*) in the portal vein of an African monkey (*Cercopithecus fuliginosus*). For further details, see Dr. Cobbold's "Memoirs," in Vols. XXII. and XXIII. of the *Linnæan Transactions;* and also Küchenmeister's *Animal and Veget. Parasites*, Syd. Soc. Transl., I., 277.)—TRANSL.

[4] *Gazette Médicale de Paris*, 1858, p. 657.

D. GALL-STONES.

1. *Historical Account.*

Gall-stones were first observed in the year 1565 by Johann Kentmann of Dresden, who communicated his discovery to Conrad Gesner, to be made use of in his great work on Fossils.[1] According to Marcellus Donatus, they were likewise found about the same time by Tournamira and Gentilis. Binivieni,[2] Vesalius,[3] and Fallopius[4] examined and described them with great care, so that already, in 1643, Fernel was enabled to treat in detail their characters, causes, and symptoms. Glisson[5] also contributed to the history of these concretions.

As regards the pathology and diagnosis of gall-stones, the work of Friedrich Hoffmann, of Halle,[6] was of far greater importance than any that preceded it. Bianchi[7] and J. B. Morgagni[8] recorded numerous fresh observations, which greatly increased the information upon this subject.

A similar remark applies to Boerhaave and Van Swieten,[9] and likewise to Sydenham[10] and Sauvages.[11]

For the first accurate investigations into the structure of gall-stones, we are indebted to Fr. August Walter,[12] who carefully described and figured the rich collection in the Museum at Berlin. To this work, the works of Sömmering,[13] Prochaska,[14] and especially of H. Meckel,[15] deserve to be added.

The first chemical examination of gall-stones originated with Galeatti,[16] but led to no result. It was not until after the discovery of cholesterine that Fourcroy and Thénard succeeded in determining anything certain as to their composition.

Quite recently Bramson, Platner, Hein, Seifert,[17] and Bouisson[18] have been more especially engaged in the chemical analysis of these concretions.

As regards the pathology, diagnosis, and treatment of the forms of disease produced by gall-stones, medical literature contains materials which it is scarcely possible, from their extent, to review. The most important observations have been collected by Fauconneau-Dufresne, in his *Traité*

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[1] *De Omnium Rerum Fossilium Genere*, &c., Tigur., 1565.

[2] *De Abditis Morborum Causis*, c. III., p. 94.

[3] *Epistola de Radice Chynæ*, p. 642.

[4] *Observationes Anatomicæ*, p. 401.

[5] *Anatomia Hepatis*, 1681.

[6] *Medic. Ration. System.*, T. VI.

[7] *Historia Hepatica.*

[8] *De Sedibus et Causis Morborum Epistola*, 37.

[9] *Commentar. in Boerhaav. Aphor.*, T. III., p. 82.

[10] *De Colica Biliosa.*

[11] *Hepatalgia Calculosa.*

[12] *Anatomisches Museum.* I. Thl. Berlin, 1796.

[13] *De Concrementis Biliariis Corporis Humani.*

[14] *Opera Minora*, Tom. II., *De Calculo Felleo.*

[15] *Mikrogeologie*, Berlin, 1856.

[16] *Commentar. Acad. Scient. Bonarari*, 1748, T. I., p. 354.

[17] *Zeitschrift f. ration. Med.*, Bd. IV., s. 191, 293; Bd. X., s. 123.

[18] *De la Bile*, Montpellier, 1843.

de l'Affection Calculeuse du Foie et du Pancreas. Paris, 1851; other memoirs will be mentioned hereafter.

In order to obtain an insight into the processes by which gall-stones are formed, and into the conditions upon which their other characters, their growth and decay depend, it is necessary to consider, in the first place, their chemical composition and structure.

2. *Chemical Characters.*[1]

The number of substances of which gall-stones may be composed is considerable. They may all be present in the bile, or they may be developed from the decomposition of this secretion. The most important of them are the following:—

a. *Cholesterine.*

Cholesterine is very rarely absent,[2] and usually forms the principal constituent of biliary concretions, many of which are composed entirely of it. In most cases it is found in a crystalline form, but sometimes it is amorphous and intimately mixed with other matters, such as fatty and saponaceous substances, pigment, &c. Notwithstanding the relatively small proportion of cholesterine in the bile, it may be reckoned that gall-stones contain, on an average, from 70 to 80 per cent. of this substance. In this respect, cholesterine bears a similar relation to gall-stones, that uric acid does to urinary calculi. Both substances are met with only in sparing quantity in the respective secretions, but, in virtue of their insolubility, they contribute mainly to the formation of concretions.

b. *Bile-Pigments.*

With a few exceptions, coloring-matter is found in all gall-stones. Several forms of pigment may be distinguished, which are partly free, and partly united with calcareous matter.

b 1. *Cholepyrrhin.*

Cholepyrrhin, either in a pure state, or more commonly in combination with lime, forms an important constituent of the nuclei, and often also of the shell and outer crust of the concretions. When the concretion is treated with chloroform, the cholepyrrhin dissolves and separates, and on evaporation crystallizes in the form of needles, prisms, and laminæ.[3] The crystals present a yellowish-brown or garnet-red color under the microscope, and form a reddish-brown, light powder, which is insoluble in water and alcohol, sparingly soluble in ether, but which is easily and entirely dissolved in chloroform, on the application of heat. Cholepyrrhin is likewise soluble in the dilute watery and alcoholic solutions of the alkalies, but when treated in this way it soon becomes changed; the brown color is converted into green (Cholechlorin) and green flakes separate on the addition of hydrochloric acid. The basic salts of the biliary acids likewise dissolve this pigment in moderate quantity.[1]

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[1] The reader is referred to the Appendix for the results of analysis of individual gall-stones.

[2] In several gall-stones from the ox, cholesterine has been ascertained to be entirely absent.

[3] See Frontispiece. Figs. 1, 2, and 3.

b 2. *Compound of Cholepyrrhin and Lime.*

(*Cholepyrrhinkalkerde.*)

This combination is found in most gall-stones, as a yellowish-red, or reddish-brown powder, which is partly mixed up with cholesterine in the form of granules or irregular scales, and is partly deposited in the form of distinct layers between the other laminæ of the calculi.

This combination, after the removal of the cholesterine by means of ether, is insoluble in water, alcohol, ether, and chloroform, but may be completely dissolved by boiling with diluted alkalies. A more scientific, although less powerful, soluble action is exerted by hydrochloric acid and chloroform; the chloroform takes up the cholepyrrhin, whilst the lime, mixed with some magnesia, oxide of iron, oxide of copper, and phosphoric acid, is retained by the hydrochloric acid.

It is impossible to isolate this compound of lime from gall-stones, because it is mixed up with the calcareous salts of the solid fatty acids, and with other substances which are equally insoluble in the ordinary simple solvents.

b 3. *Cholechlorin.*

This green pigment is never found but in sparing quantity in gall-stones, and when it occurs as such is always combined with lime. In its

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[1] When treated with concentrated sulphuric acid, the crystals of cholepyrrhin dissolve with a yellow color, and separate in green flakes on the addition of water. Dilute acids do not affect the crystals, but they become somewhat darker in color; nitric acid changes the color of the solution very rapidly into green, blne, violet, and red. The elementary analysis performed by my friend Professor Städeler, of Zurich, of cholepyrrhin purified by repeated crystallization from boiling, and washing with cold, chloroform, yielded results from which the chemical formula $C_{18} H_9 N O_4$ is calculated.

		Calculated Formula.		Actual Result of Analysis.
18 equivalents of carbon	=	108	66·26	66·52
9 " " hydrogen	=	9	5·52	6·00
1 " " nitrogen	=	14	8·59	8·70
4 " " oxygen	=	32	19·63	18·78
		163	100·00	100·00

Hence cholepyrrhin only differs from isatine, the product of the oxidation of indigo by the elements of one equivalent of hyduret of methyle.

$$C_{16} H_5 N O_4 + C_2 \left.\begin{matrix} H_3 \\ H \end{matrix}\right\} = C_{18} H_9 N O_4.$$

Moreover, cholepyrrhin contains 2 equivalents of water less than tyrosine, and 2 equivalents of oxygen less than hippuric acid. According to this, the occurrence of indigo in human urine, which has been repeatedly observed, is a less remarkable circumstance than might at first be thought. It will be interesting to study more closely the relations between cholepyrrhin and isatine.

Crystals of cholepyrrhin may likewise be obtained by treating fresh, dried, human bile with chloroform.

purest possible condition, it exists in the form of a dark-green powder composed of fine granules which is insoluble in water, but perfectly soluble in alcohol, and partially so in ether and chloroform. The solutions are of a beautiful grass-green color; on the addition of nitric acid, the color is converted into blue, violet, and red, and ultimately entirely disappears. Cholechlorin is dissolved by watery and alcoholic solutions of the alkalies, from which it is again deposited in the form of flakes, on the addition of acids.

This coloring-matter originates from the oxidation of cholepyrrhin, as has been already pointed out.

b 4. *Altered Bile-Pigments.*

Independently of the dirty brownish-green, for the most part impure pigments, or transition stages of cholepyrrhin and cholechlorin, a substance is found in dark gall-stones, which is evidently nearly allied to cholepyrrhin, but which is insoluble in chloroform; it is partially dissolved, however, in spirituous alkaline solutions, with a light-yellow color, and yields the ordinary reaction of bile-pigment with nitric acid. Moreover, there is sometimes likewise observed a brown material resembling humine, which is partially dissolved by boiling in a watery solution of potash; but this solution presents neither the reaction of bile-pigment nor of the biliary acids; brown flakes are precipitated from it by acids. These substances, for the most part, contain nitrogen.[1]

c. *Biliary Acids and their Calcareous Salts.*

Small quantities of biliary acids in combination with a base, soluble in water, and more completely so in spirit of wine, are found in most gall-stones.

Free cholic acid has been found in two gall-stones from an ox; it was soluble in spirit of wine, and partly also in ether. Taurocholic and glycocholic acids were mixed with it in sparing quantity. Combinations of the biliary acids with lime, have been found in gall-stones from the human subject and from the ox.

These lime salts are dissolved with difficulty in water, but more readily in spirit of wine; diluted alkalies have little effect upon them; mineral acids remove the base.

c 1. *Glycocholate of Lime.*

Glycocholate of lime from a human gall-stone, when recrystallized from a spirituous solution, consists of small, glistening, crystalline masses, resembling leucine (Fig. 24).

The same forms of crystals have been obtained from the gall-stone of an ox.

c 2. *Cholate of Lime.*

Cholate of lime is sometimes met with in considerable quantity, especially in the gall-stones of Ruminants. It sometimes forms earthy layers, which, under the microscope, are seen to consist of small needle-shaped crystals, arranged, for the most part, in a confused manner (Fig. 25).

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[1] I have never found in any gall-stone the black pigment described by Powel, which is said to consist of pure carbon. See Berzelius' *Zoochemie*, s. 345.

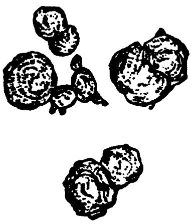

FIG. 24.—Crystalline masses of glycocholate of lime from a human gall-stone.

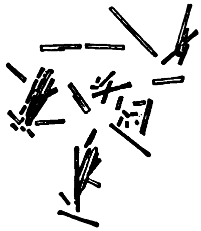

FIG. 25.—Crystals of cholate of lime from a gall-stone.

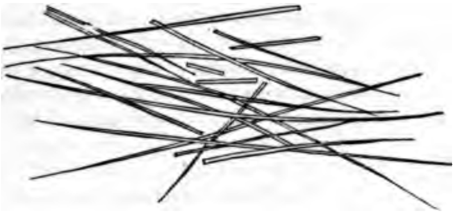

FIG. 26.—Needle-shaped crystals of cholate of lime, crystallized from a solution in rectified spirit.

From a solution in rectified spirit this salt separates in the form of needles, pointed at both extremities, or sometimes blunted (Fig. 26).

d. *Fatty Acids and Soaps.*

d 1. *Free Fatty Acids.*

Free fatty acids are rarely found in large quantity in human gall-stones; but they exist to a considerable amount in the gall-stones of the ox. They crystallize from a spirituous solution in the form of crystalline masses, consisting of glistening white plates. They resemble stearic acid

d 2. *Compounds of the Fatty Acids with Lime.*

The compounds of the fatty acids, on the other hand, are of very common occurrence in human gall-stones. The fatty acids, when isolated and crystallized from spirit of wine, form elliptical plates. In some cases Margarate of Lime is the chief constituent of human gall-stones. In 1847 I examined a calculus in the collection at Göttingen which contained 68 per cent. of margarate of lime, with 28 per cent. of cholesterine, and 3 per cent. of the compound of cholepyrrhin and lime and mucus.[1] Taylor[2] also has analyzed a similar calculus.

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[1] The melting point of the fatty acid was 58° cent. (136°.4 Fahr.). Neukomm found it to be 58°.5 cent. (137°.7 Fahr.), while that of the fatty acid from the gall-stone of an ox was only 53° cent. (127°.4 Fahr.).

[2] *Medico-Chirurgical Transactions*, Vol. XV.

e. *Mucus and Epithelium.*

Both mucus and epithelium are met with chiefly in the nucleus, and, as a rule, it is an easy matter to discover the epithelium under the microscope after the removal of the soluble matters. The earlier investigators frequently described the mucus as albumen. I have never succeeded in finding albumen in any human gall-stone; in only one of the gall-stones from an ox that I have examined did a nitrogenous substance, presenting the characters of albumen, remain after removal of the pigment.

f. *Uric Acid.*

Uric acid has been found in abundance in a cylindrical concretion described as a gall-stone, but there were some doubts as to the place of origin of this concretion. Stöckhardt (*De Cholelithis*, Lipsiæ, 1832) and Faber, years ago, discovered uric acid in concretions of the same nature. It must not, however, be forgotten, how readily concretions in collections are confounded with one another and wrongly described.

g. *Inorganic Matters.*

g 1. *Oxides of the ponderous Metals.*

I have always succeeded in finding iron, and in rarer cases, I have discovered manganese; copper, which had been previously detected in black concretions by Bertozzi[1] and Heller,[2] was always present in the larger concretions containing pigment from the human subject, but was absent in the gall-stones of the ox.

Lead, antimony, and arsenic have been sought for without any result. Several dark-green, mulberry-shaped concretions, however, from the human subject, contained metallic quicksilver in abundance; this metal was seen in the interior of small calculi in the form of glistening globules, and was proved to be mercury by its chemical reactions. Unfortunately, no information could be obtained respecting the previous history of the person in whose body they were found.[3]

g 2. *Earths.*

Carbonate of lime is found in the ash of all gall-stones, and often in large quantity. One portion of it is in combination with cholepyrrhin, the fatty acids, or cholic acid, while another exists in the free state. Crystalline deposits of carbonate of lime will be described when we come to consider the structure of gall-stones. As a rule, the lime is accompanied by magnesia.

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[1] *Ann. di Chimica.* Milano Ingl., 1845, s. 32.

[2] Heller's *Archiv*, 1845, s. 238.

[3] Lacarterie (*Gazette de Santé*, 15 Avril, 1827) has described a gall-stone, the size of a plum, and consisting, for the most part, of cholesterine, the nucleus of which, when dissolved by heat, presented numerous globules of quicksilver. In this case the patient had been subjected to an ointment-cure (*Schmiercur*). Beigel also (*Wien. Medic. Wochenschrift*, No. 15, 1856), with the aid of a lens, observed globules of metallic quicksilver in a brown gall-stone.

In addition to the earthy carbonates, phosphates are constantly present; but their amount is in most cases trifling. Small quantities of the earthy sulphates may likewise always be discovered.[1]

Lastly, gall-stones are met with, which consist entirely of earths, and chiefly of the earthy carbonates.[2]

g 3. *Alkalies, Potash, and Soda Salts.*

These substances are only found in inferior quantities.

3. *Physical Characters of Gall-Stones, their Form, Structure, &c.*

Solitary concretions are rarely found in the biliary passages. In most cases they occur in larger numbers, usually amounting to from five to ten or thirty, and occasionally even to a thousand. Morgagni mentions a case where there were 3,000; Hoffmann counted 3,646 in one case; and a gall-bladder containing 7,802 calculi is preserved in Otto's Collection. In a female, 61 years of age, who died in my Clinique at Breslau, I observed 1,950 pearl-like glistening concretions.

When numerous gall-stones are found together, all of them, almost invariably, have the same characters and composition, and present a similar succession of layers, inasmuch as all of them owe their origin and growth to the same morbid process. To this rule, however, there are exceptions; dissimilar concretions may be met with in the same gall-bladder. For example, we may find a large calculus with a radiated structure accompanied by numerous small laminated concretions. Walter and Hein mention several observations of this nature. On the whole, however, this is a rare occurrence; out of 632 cases collected by Hein, dissimilar calculi were found in 28 only.

The size of gall-stones varies from that of a millet-seed to that of a hen's-egg. J. F. Meckel has described a solitary calculus measuring 5 Paris inches in length, and 4 inches in circumference. I have repeatedly met with concretions from 2 to 2½ Paris inches long, and 1 inch thick.[3]

The form of gall-stones is almost always primarily globular; but in their subsequent growth they usually depart in many ways from their original shape. Very large concretions usually assume an egg-shaped or cylindrical form, corresponding to the form of the gall-bladder which they fill up.

When numerous calculi are produced at the same time, polyangular forms are usually developed, such as tetrahedres and octohedres, with more or less regular angles, while the concretions become flattened or ground down at their places of contact. The facets, of which sometimes so many as twelve are found, are flat, or occasionally excavated, and often exhibit distinct striæ corresponding to the worn-off layers. When there are only a few large gall-stones in the gall-bladder they are articulated at their places of contact by smooth or excavated surfaces. (Fig. 27.)

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[1] Bramson, Seifert, and Hein found large quantities of sulphate of lime.

[2] Bailly and Henry, Steinberg, Hein, and others, have described calculi of this sort.

[3] One Paris inch contains twelve Paris lines; one English inch contains only 11·25 Paris lines. See Vol. I., p. 13, *note*.—TRANSL.

In addition to the globular form, and the varieties deducible from it, biliary concretions are met with not unfrequently, that present a warty or mulberry form. They consist sometimes of cholesterine, and then the form is due to a radiated structure with crystals of cholesterine deposited upon the outer surface, at other times of pigment or bile-resin, and lastly, sometimes of carbonate of lime. Warty deposits, consisting of cholesterine or crystalline masses of lime, are not unfrequently found upon the larger calculi. Concretions of an indented or branched form, resembling the spade-like portions (*Schaufeln*) of the antlers of the reindeer, such as have been described by Hein and H. Meckel, are sometimes formed of crystalline masses of lime alone.

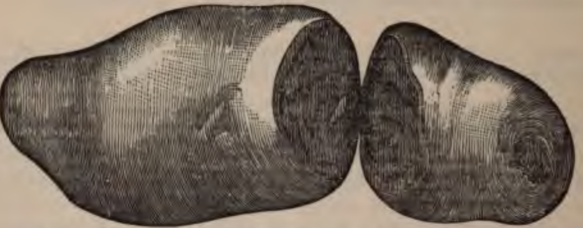

FIG. 27.—Two large gall-stones from the gall-bladder, articulated by smooth surfaces.

Among the rarer forms of gall-stones may be mentioned the flattened, leaf-like concretions, with black, metallic glistening surfaces, and likewise the branched varieties which are developed in the bile-ducts, and form a cast of these canals, and which are sometimes hollow and tubular, as was the case with those found by Glisson in the liver of an ox; also the snow-white crystalline concretions of a silvery lustrè, composed of thick crests or ridges of columnar, or rhomboidal crystals, similar to heavy-spar; and lastly, the calculi described by Seifert (*op. cit.*, p. 127), which presented the form of pale-blue six-sided stars, and of which between 20 and 30 were found in the gall-bladder.

The color of gall-stones is in most cases brownish or greenish-yellow; all shades of color are met with, however, from a snow-white to a dark-brown and coal-black; more rarely gall-stones are colored blue, green, or red. Bile-pigment and its derivatives constitute the basis of the color in every instance.

The specific gravity of gall-stones has on many occasions been determined erroneously, because dried specimens have been employed for the purpose.

The earlier physicians, and likewise Sömmering and Gren, and in modern times, L'Hérétier and Valentin, have expressed the opinion that some gall-stones are lighter than water. This is a mistake: dry concretions containing air alone float in water; fresh gall-stones, even those that consist of pure cholesterine, sink in water. The specific gravity of those concretions that are composed of pigment, bile-resin, and calcareous salts, is still greater, amounting, according to Batillat, to 1·966, and, according to Bley, to 1·580.

The structure of gall-stones, which depends upon the mode of deposition of their component elements, varies very greatly, and attracted the attention of the earliest observers, such as Kentmann, Fabricius Hildanus, and Malpighi. It was carefully described by F. A. Walter, afterwards by Hein, and more particularly by H. Meckel.[1]

An accurate knowledge of the structure of gall-stones is of especial importance, inasmuch as by it we obtain the best information respecting the conditions of their origin and growth, and as the structure enables us to discover the first traces and causes of their disintegration.

Accordingly, we distinguish the following forms of concretions in the biliary passages:—

a. *Simple, Homogeneous Calculi.*

The simple, homogeneous calculi have a uniform texture, and present an earthy, saponaceous, or crystalline fracture.

Those with an earthy fracture consist of earthy-matter, or of an intimate admixture of cholesterine, and the compound of cholepyrrhin and lime; those with a saponaceous fracture consist of bile-resin, or its calcareous compound, or of cholesterine and soaps, while the crystalline variety consists of pure crystallized cholesterine. On the whole, these homogeneous concretions without a nucleus and shell are rare.

b. *Compound Calculi, containing a Nucleus.*

The compound calculi consist of a central nucleus, surrounded by a shell of greater or less thickness, which is in its turn usually covered by an outer crust. These three parts, nucleus, shell, and crust, may be distinguished in most gall-stones; it rarely happens that the crust is wanting.

The Nucleus.

The nucleus is in most cases brown or black, and usually consists of the compound of cholepyrrhin and lime, with an admixture of mucus, and occasionally it contains cholate of lime, or it is formed of crystalline masses of cholesterine. The nucleus is sometimes perfect, but at other times, in consequence of drying, it is cleft, and in the latter case a deposit of white crystals of cholesterine may usually be observed in the crevices.

In exceptional cases foreign bodies form the nucleus of the concretions. Bouisson observed the nucleus formed by a small clot of blood. Lobstein found a dead and dried-up round worm, constituting the nucleus of a gall-stone, lying in the ductus choledochus of a female, 68 years of age; thirty other round worms were found in the hepatic ducts. Bouisson discovered a fragment of a Distoma hepaticum, forming the nucleus of a gall-stone, in an ox. Lastly, Nauche (*Lancette Française*, 17th Sept., 1835) met with a concretion in the gall-bladder of a man, which was deposited around a needle, about 2 centimètres (9⅜ Eng. lines) in length, and fastened to the wall of the gall-bladder.

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[1] Walter (*Anatomisches Museum*, Berlin, 1796, 1. Thl., s. 93) divided gall-stones into the striated, the laminated, and those provided with an external crust (Cholelithi striati, lamellati et corticati). The striated gall-stones he subdivided into the transparent and opaque, and into those with a smooth and those with an uneven surface. Under the laminated he included those whose substance was deposited in layers, like those of an onion, around a central nucleus. To the third class, or *Cholelithi corticati*, he referred all those concretions in which a nucleus, an external crust, and a substance intermediate between the nucleus and cortex, could be discovered; this class included the larger number of all gall-stones. Hein (*Zeitschrift f. ration. Medicin.*, Bd. IV., s. 352) distinguished, in the first place, the simple calculi, consisting of earthy-matter, pigment, or cholesterine; and in the second place, the compound gall-stones; and the latter he subdivided into (*a*) those whose component parts were uniformly mixed, whether cleft or entire; and (*b*) those unequally mixed, with a nucleus and cortex. H. Meckel *Mikrogeologie*, *Ueber Concremente*, *herausgegeben von Billroth*, Berlin, 1856, s. 85) divided gall-stones into eight classes.

A gall-stone, weighing four ounces, is preserved in the collection at Göttingen, which was developed in an abscess of the liver, resulting from a perforating ulcer of the stomach. Fuchs and myself found a plum-stone forming the nucleus of this concretion.

On the whole, however, such appearances are rare. It more frequently happens that a small gall-stone forms the nucleus of a larger one. An example of this sort of calculus is represented in Fig. 28.

As a rule, we find only one nucleus. Cases, however, occur, where there are several nuclei surrounded by the same shell. Fauconneau-Dufresne met with four nuclei in a pyramidal-shaped concretion, and Guilbert found five nuclei in a round gall-stone. The multiple nuclei in these cases are formed by small gall-stones rolled together in a ball.

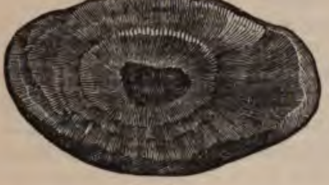

FIG 28.

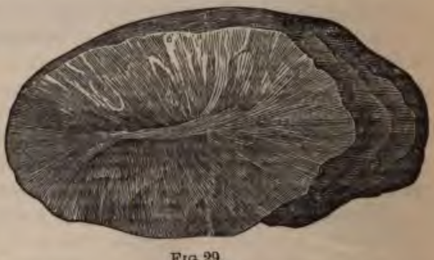

FIG 29.

FIG. 28.—Compound gall-stone, with concentric laminæ, and with a nucleus formed by a smaller gall-stone.

FIG. 29.—Gall-stone with an eccentric nucleus, the concentric laminæ being only deposited at one end.

In small concretions the nucleus always lies in the centre, but in the larger ones the growth is often unequal, and the nucleus has an eccentric situation, as is represented in Fig. 29, where concentric laminæ are only deposited at one extremity of the calculus.

The Shell (*Die Schale*).

The shell immediately surrounds the nucleus, is usually striated, and consists of crystals of cholesterine, arranged in a radiated manner; these crystals are sometimes pure and at other times mixed with pigment. In most cases, in addition to the radiated striæ, we can distinguish a concentric lamination, indicating that the growth of the concretions has resulted from the deposit of successive layers.

In rarer cases we find calculi, whose shell consists of concentric laminæ, surrounding the nucleus, like the layers of an onion. Walter was able to figure only a few examples of this form, which he designated *Cholelithi lamellati.*

In many cases the shell is devoid of all structure; it is of a soapy or earthy character, and presents neither striæ nor laminæ.

The External Crust (*Die Rinde*).

The external crust is wanting in a few concretions, the radiated arrangement of the plates of cholesterine reaching to the outer surface, and forming here warty prominences or ridges. These cases, however, are exceptions to the general rule.

In the majority of cases the shell is covered by an external crust of greater or less thickness, the latter being sharply defined from the former by its color, lamination, and consistence. This crust may be of uniform thickness or it may be more developed at one extremity than at the other in the case of elongated stones, and not unfrequently it is also covered with warty prominences.

The composition of the external crust varies greatly. It may consist:—

1. Of cholesterine, which usually covers the surface of round or polyhedral stones in the form of smooth, horizontal layers, often separated from one another by pigment, and imparts to them a covering of a snow-white or yellowish color, and occasionally of a satiny lustre. In other cases the cholesterine forms crystalline excrescences.
2. Of the compound of cholepyrrhin and lime. This usually forms only a thin covering, imparting a brown or blackish color to the calculus.
3. Of carbonate of lime. This substance is sometimes found in the form of a thick brown covering, of an earthy fracture, at another time as a smooth white envelope, consisting of one or several laminæ, separated by layers of pigment, or, lastly, it may form a warty or indented encrustation, when the lime is deposited in rod-like crystals.

These are the most important varieties presented by the outer crust of gall-stones. In exceptional cases it exhibits a more composite structure. It is sometimes covered with warty excrescences, which on the one side, consist of carbonate of lime, and on the other of crystalline masses of cholesterine; or the deeper portion of the crust consists of horizontal layers of cholesterine, while crystals of the same substance, arranged in a radiating manner, form warty excrescences upon the outer surface; or, lastly, granular masses of pigment are deposited on the angles and corners of polyhedral gall-stones.

In addition to the gall-stones proper, pulverulent or gritty deposits, similar to those which are met with in the urinary passages, are found in the excretory apparatus of the liver, as was long since pointed out by Haller.[1] This biliary gravel sometimes consists of minute calculi, which in structure and composition resemble in every respect the larger concretions, but at other times, of pulverulent, structureless deposits of pigment, bile-resin and cholesterine, mixed up together, and sometimes connected by the mucus of the bile-ducts (see Observation No. XXXII.). Indications of the commencement of such deposits are found in almost every case where the hepatic secretion stagnates for a long time and undergoes decomposition. These deposits throw much light upon the conditions that promote the origin of gall-stones.

4. *Mode of Origin of Gall-stones.*

The earlier physicians accounted for the origin of gall-stones in a purely mechanical manner, and attributed it to the inspissation of stagnant bile;[1] it was not until a later period that the opinion was arrived at that the decomposition of the bile, and its coagulation by means of acids, contributed to their formation. Maclury, and afterwards Forbes, expressed the opinion that the acids of the stomach induced coagulation in the contents of the duodenum and gall-bladder. There was more foundation for the assumption of Thénard, who referred the separation of stone-forming pigment to the diminished proportion of soda in the bile.

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[1] *Elementa Physiol.*, Tom. VI., p. 576. "Etiam arenulæ in hepate reperiuntur."

In recent times it has been attempted to explain the origin of gall-stones, either on the supposition of an increased amount of lime in the bile inducing a separation of the pigment in the form of a compound with lime (Bramsen), or on that of a decomposition of the salts of soda, and the biliary acids causing the precipitation of the cholesterine and pigment, or lastly, on that of an increased formation of cholesterine in the liver or in the blood. An important influence has likewise been usually ascribed to catarrh of the bile-ducts.

The substances which have been shown to enter into the composition of gall-stones are all contained in a state of solution in normal bile, with the sole exception of the epithelium and mucus. We must therefore endeavor, in the first place, to discover the causes which induce the separation of those materials that form the foundation or the nuclei of the concretions, such as the cholepyrrhin, whether in a free state or in combination with lime, the cholate of lime, and the cholesterine. A further question for investigation will be the manner in which the precipitates come to form the concretions.

The mere concentration of the bile cannot be regarded as the cause of the separation of the matters by which gall-stones are formed; the substances remain in a state of solution as long as the bile is unchanged, and they are not precipitated until the instable salt of soda and the biliary acids is decomposed by the action of the mucus of the gall-bladder. The commencement of this decomposition may usually be discerned in bile, which has been stagnant for a long time in the gall-bladder.[2] Stagnation

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[1] Boerhaave and Van Swieten (*Comment.*, T. III., p. 332); Vater (*Diss. de Calculi in vesica fellea Generatione*, Vitebergæ, 1722). "Immo nullum est dubium, bilem concretam induratione et exsiccatione, findi et in plura frustula tot calculos constituentia diffringi posse."

[2] Bile which has been retained for a long time in the gall-bladder soon presents traces of decomposition, more particularly when the mucous membrane is in a state of catarrhal inflammation. As has been pointed out by Meckel, it frequently assumes a green color, becomes acid, and deposits flaky precipitates of a brownish-red or dark-brown color. On microscopic examination it is found to contain the following elements:—

1. Epithelium cells of the gall-bladder, either isolated or usually united in large lamellæ, and likewise flakes of mucus, more or less deeply tinged with pigment.
2. Rod-like crystals, or sometimes granules of cholepyrrhin, either black or reddish-brown. They are soluble in chloroform, and are again deposited after evaporation, in the usual form of cholepyrrhin represented in Figs. 1, 2, and 3 (Frontispiece).
3. Light or brown transparent globules, to which crystals of pigment are often adherent. They must be regarded as bile-resin.
4. Cholesterine, in perfect or fragmentary crystals.
5. Round globules, composed of concentric laminæ of a light or brown color.
6. Under certain circumstances, and particularly when the mucous membrane of the gall-bladder is greatly irritated by the presence of calculi, crystals of carbonate of lime are found in the form of little rods, concentric globules, or radiated crystalline masses. These forms are represented in Frontispiece, Fig. 5.

Thudichum (*The Lancet*, Oct. 20, 1860) has very carefully examined the products arising from the spontaneous decomposition of bile, as was formerly done by Gorup-

and decomposition of the bile thus constitute the primary cause of the formation of gall-stones.

Cholepyrrhin, which in its pure state is insoluble in water, is readily dissolved by cholate of soda and by every alkaline fluid. The decomposition of the cholate of soda, no less than the conversion of an alkaline into an acid reaction of the bile, entails a separation of the cholepyrrhin. Hence crystals of cholepyrrhin are usually found in abundance in acid bile, and in most cases they are accompanied by globules of bile-resin.

The cholesterine also separates in similar conditions of the bile. Berzelius (*Zoochemie*, s. 524) has called attention to the circumstance that the cholesterine becomes free when bile containing no mucus is digested with sulphuric acid, by means of which the bilin is decomposed. The cholate of soda and the soapy matters hold the cholesterine in solution; when the former are decomposed, the latter is precipitated. I have found numerous plates of cholesterine in green bile, which was stagnating in closed cysts in the liver.

It is still undetermined whether the increased quantity of cholesterine in the blood at an advanced age leads to an increased proportion of this substance in the bile, and so accounts in part for the greater frequency of gall-stones at this period of life. At all events, the quantity of cholesterine in the blood is influenced by the secretion of bile; the former increases when the hepatic secretion diminishes. (See Vol. I., p. 69.)

The separation of pigment, bile-resin, and cholesterine may thus be regarded as the consequence of the decomposition of the bile. But whence comes the lime with which the cholepyrrhin, the fatty acids, and the cholic acid are for the most part combined? According to my observations it is furnished, not by the liver, but mainly by the mucous membrane of the gall-bladder. I have repeatedly found this membrane covered by numberless crystals of carbonate of lime, and on one occasion I saw a gall-stone which was firmly attached to the wall of the gall-bladder, covered with crystalline masses of cholesterine on its free surface that was bathed by bile, whilst a thick crust of carbonate of lime was deposited over all that portion of the calculus which was in contact with the mucous membrane.

It is still undecided whether the bile, under certain circumstances, may be overcharged with lime.

But simple precipitation of the substances above mentioned is not sufficient for the formation of gall-stones; the precipitates may pass into the intestine along with the other contents of the gall-bladder. For the development of concretions, it is necessary that the precipitates be retained for a long time, and this end is promoted by the occurrence of catarrh of the gall-bladder, as has been justly pointed out by Hein and Meckel.

The morbid conditions, upon which the formation of the nucleus depends, are not always the same as those to which the growth of the concretions is due; they may vary greatly, and the composition of the several layers varies accordingly.

If we make any attempt to trace the main causes of the formation of gall-stones, our knowledge is still found to be defective in many particulars.

Besanez. He found that bile, which had been preserved in bottles for one or two years, had an acid reaction, and deposited a copious greenish-brown sediment, consisting of pigment, cholic acid, phosphate of lime and magnesia, and mucus. The supernatant fluid contained cholate of soda, taurine, acetate of soda, and valerianate of ammonia.

The conditions upon which their very varying structure, and the arrangement and direction of the different layers, depends, are unknown. H. Meckel has ingeniously endeavored to prove that secondary metamorphoses take place in gall-stones similar to those which occur in geological formations. According to him all gall-stones are originally formless, and are developed from the deposit of concentric layers; subsequently the layers become fissured, at some places the alkali is dissolved out, and its place is supplied by secondary crystalline deposits, arranged in a radiated manner. Their metamorphoses may take place at the centre as well as at the periphery of the calculi. There are not sufficient facts, however, to afford a solid foundation for these views.

5. *Disintegration of Gall-stones.*

Not unfrequently gall-stones exhibit indications of commencing disintegration. The coating of cholesterine has disappeared from the angles and edges, and occasionally also from the surfaces of the polyhedral forms. The round stones present losses of substance, or erosions, resembling caries of the teeth, and penetrating through several layers. These changes appear to be the result of chemical action, the cholesterine, and the combination of cholepyrrhin and lime being dissolved at some places by the alkaline bile. When the stone is covered by a coating of lime, the action described is impossible; in such a case it is only an acid fluid that can take effect.

Gall-stones may likewise be destroyed by cleavage; fragments of a radiated structure, or segments from which perfect globular or angular calculi may be built up, are occasionally met with. I have seen fragments of this sort in the gall-bladder, and likewise in the fæces.

These processes are of importance in respect to the cure of gall-stones.

6. *Ætiology.*

a. *Age.*

The tendency to gall-stones increases with the advance of life; before thirty years of age they are rarely observed, and during childhood their occurrence is exceptional. Of 395 cases collected by Hein, only 15 persons were under twenty-five, and only 3 under twenty; the patients in the three last cases were two young females of seventeen and eighteen, and a boy of sixteen. Bouisson found three gall-stones, with constriction of the ductus choledochus in the gall-bladder of a newly-born infant. Portal (*Maladies du Foie*, p. 325) observed several concretions in the hepatic ducts, and one in the ductus communis of a child who died on the twenty-fifth day of an attack of jaundice; the same author mentions two other cases of a similar nature. Cruveilhier also reports the occurrence of gall-stones in children during the first years of life. The youngest individual with the affection under consideration, that has come under my notice, was a girl, seven years of age; in this case there was waxy degeneration of the liver, spleen, and kidneys, consequent on disease of the hip-joint.

b. *Sex.*

Females are more liable to gall-stones than males. This fact had already been determined by the observations of Fr. Hoffmann, Haller, Sömmering, Pinel, and Walter. Out of 620 cases, Hein ascertained that 377 were females, and 243 males, making a proportion of nearly 3 to 2. It is undetermined upon what circumstances this difference depends, whether upon the more sedentary mode of life, or diet containing a larger proportion of vegetables, or the sexual functions.

c. *Morbid Changes in the Liver and Biliary Passages.*

Morbid changes in the liver and biliary passages, interfering with the excretion of bile, favor the development of concretions. Under this head may be mentioned cancer of the liver, and especially of the gall-bladder, adhesions of the wall of the gall-bladder to the neighboring parts, by means of which the organ becomes contracted, and the escape of its contents is impeded; repeated attacks of catarrh of the mucous membrane, &c.

d. *Sedentary Habits of Life.*

Sedentary habits of life retard the excretion of bile. Tissot accordingly ranks gall-stones among the diseases of men-of-letters; and Sömmering states that he found them particularly frequent in persons who had been imprisoned for a long time in the jails at Cassel and Mayence. For the same reason, they are not unfrequently developed after protracted confinement to bed from illness; Glisson had previously made the observation that cows are more apt to suffer from gall-stones, when in stables during the winter, than when at pasture during the summer.

e. *Errors in Diet.*

Too large a consumption of animal food and of spirits is often blamed for predisposing to gall-stones. Their origin is, perhaps, referred, with more justice, to too small a number of meals, in consequence of which the gall-bladder is less frequently emptied than it ought to be.

f. *Diathesis.*

No calculous diathesis arising from abnormal states of the metamorphosis of matter, such as lead to the formation of urinary calculi, can be discovered in the case of gall-stones. They are met with in the most different constitutions, and are more dependent upon local than upon general derangements. Their coexistence with urinary calculi, of which mention has been made by Baglivi, Bianchi, Fr. Hoffmann, and others, must be regarded as an entirely accidental circumstance.

g. *Locality.*

Whether gall-stones are more frequent in certain countries than in others, owing to peculiarities in the nature of the soil, has not yet been determined by statistics. The data which have been appealed to, in order to prove that localities with calcareous water predispose to gall-stones, are not very authentic.

7. *Situation of Gall-stones.*

Gall-stones may be formed wherever bile is present. They are found in any part of the excretory apparatus of the liver, from the roots of the hepatic duct at the margins of the lobules, to the opening of the ductus communis into the duodenum.

a. *Gall-stones in the interior of the Liver, in the branches of the Hepatic Duct.*

Gall-stones are rare in this locality. Morgagni, however, long since collected a series of observations from the works of Plater, Fallopius, Dodonæus, Columbus, Ruysch, and others, showing that concretions had been found in the interior of the liver. More recently, Portal, Cruveilhier (*Anat. Pathol.*, Livr. XII., p. 5), Fauconneau-Dufresne, and others, have recorded cases of this nature, while five have occurred in my own practice.

Biliary concretions in this locality most frequently present the form of (See Observation No. XXXII.) small brown or black grains, existing in considerable numbers and filling up the ducts as far as their commencement. Sometimes also we meet with larger round stones, or, more rarely, with branched, coral-like concretions, which form casts of the ducts, and are sometimes solid, but at other times hollow (Plater and Glisson,[1] Cruveilhier.)

The branches of the hepatic duct are dilated by these deposits, either uniformly or in a saccular manner; occasionally they are obliterated, and cysts are developed with thick, firm walls, enclosing the concretions, and surrounded by glandular tissue, which may be either normal or indurated and in a state of fatty degeneration, as was found by Berlin (*Nederl. Tijdschr.*, T. I., p. 321).

In rare cases large stones are found encysted in the manner just described. Pierquin saw one the size of a pigeon's-egg, and I have already alluded to another, almost as large as a hen's-egg, which had a plum-stone for its nucleus, and was developed in the interior of an hepatic abscess.

Moreover, that concretions may give rise to inflammation and ulceration of the bile-ducts, and also to hepatic abscesses and pylephlebitis, has been already pointed out under the head of each of these diseases, where observations will be found in support of the statements.

b. *Gall-stones in the Hepatic Duct.*

Gall-stones are rarely arrested in the hepatic duct, because they only reach it from the small branches in the interior of the liver, and consequently pass on without any difficulty through the larger tube. Andral, Cruveilhier, Wilson, and others, have found concretions in this duct on making *post-mortem* examinations, some of which were loose, while others were impacted, or prevented from advancing by the ductus choledochus being filled up at the same time. On the whole, however, observations of this sort are rare. When the hepatic duct is blocked up by concretions, the immediate consequence is an obstruction to the flow of bile, extending over the whole of the ducts within the liver, and accompanied by all the symptoms to which such a condition usually gives rise. Such a lesion would only be distinguishable from an occlusion of the ductus choledochus, by the absence of any distention of the gall-bladder. Wolf has recorded a case, in which a gall-stone in this situation gave rise to violent colic, and terminated fatally by rupture of the hepatic duct.

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[1] *Anat. Hepat.*, Cap. VII.

c. *Gall-stones in the Gall-Bladder and Cystic Duct.*

Gall-stones are found most frequently and in largest numbers in the gall-bladder. This organ is the peculiar locality for their formation, and from this, the numerous derangements that give rise to them usually proceed.

The gall-bladder itself is the part that suffers first from their formation. The rougher and harder the surface of the concretions is, the more is the mucous membrane irritated. Ulcers are frequently developed,[1] which penetrate to a greater or less depth, and not uncommonly lead to perforation. Moreover, diphtheritic exudations may be observed on the surface of the mucous membrane, and purulent fluid in the interior of the gall-bladder itself.

In other cases the walls of the gall-bladder become hypertrophied. Its muscular tissue is developed in a similar manner to what is observed in a diseased urinary bladder (Amussat, Louis, Andral), and the inner surface becomes covered with reticulated prominences, forming pouch-shaped depressions, in which the concretions are impacted.[2] At the same time, adhesions are frequently developed between the gall-bladder and the neighboring organs, the pylorus, duodenum, colon, and abdominal walls.

When the gall-bladder is filled up by a large solitary calculus, the mucous membrane is in most cases smooth, like a serous membrane, and in close contact with the concretion; its muscular coat is atrophied, and its external covering is white and thickened.[3] Sometimes we see two or more large stones that form a sort of articulation at the places where they come in contact (Fig. 30), or we meet with large conglomerate, polyhedral con-

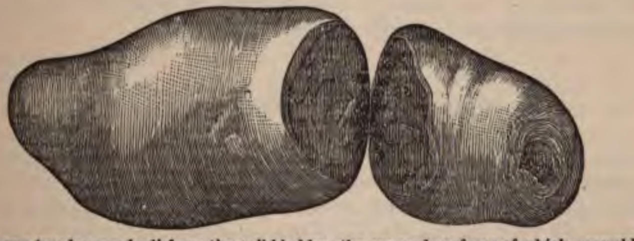

FIG. 30.—Shows two large calculi from the gall-bladder, the opposed surfaces of which resemble an articulation.

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[1] I have seen such ulcers covered with dense clusters of crystals of hæmatoidine. For the coexistence of cicatrices of the mucous membrane of the gall-bladder with gall-stones, see Observation No. XXXVIII., p. 220.

[2] Occasionally gall-stones appear to be developed in the glands of the mucous membrane of the gall-bladder, which have been recently more carefully described by Luschka. These glands lie in the wall of the gall-bladder, and present only dark dots upon its inner surface, which correspond to the opening of the glands. Morgagni mentioned them long ago in the 37th Epistle of his great work.

[3] See above, "Atheroma of the Gall-Bladder," p. 162.

cretions.[1] Not unfrequently isolated concretions appear to be encysted in peculiar pouches. Under the circumstances just mentioned, the neck of the gall-bladder is usually closed, while the bladder itself, in addition to the concretions, contains only a thin, gray layer of fatty matter, or a small quantity of glutinous fluid, resembling synovia. In this way the gall-bladder is destroyed, but the concretions are rendered harmless, and may exist for a long time without giving rise to any injurious consequences.

Gall-stones may leave the gall-bladder in two ways; they may pass through the cystic duct into the ductus communis, and from this into the duodenum, or they may escape by fistulous openings into the stomach or intestine, or externally through the abdominal walls.

Most frequently they penetrate into the cystic duct, and during their passage through this narrow tortuous canal give rise to colicky pains, which will be considered more carefully hereafter. They are propelled along the duct, with the bile, by the contraction of the gall-bladder and of the abdominal muscles. Small concretions traverse the duct without any difficulty, but large ones must first flatten out the valves, and gradually dilate the duct before they can pass on. Not unfrequently it happens that large stones penetrate the duct by one end, and there remain firmly impacted, so that they can be moved neither forwards or backwards. Smaller concretions, which are arrested between the folds of the valves, grow and attain a considerable size in these localities, owing to deposits from the bile flowing over them.

The impaction of gall-stones, when not soon overcome, gives rise to inflammation, which in most cases leads to obliteration, but occasionally is of a more violent nature, and spreads to the peritoneum, or leads to gangrene of the coats of the gall-bladder, with effusion of bile into the abdominal cavity. Bretonneau has reported an example of the last-mentioned mode of termination.

Obliteration of the neck of the gall-blader induces the lesion already described as *Hydrops Cystidis Falleœ.*

d. *Gall-stones in the Ductus Choledochus.*

Through this duct all concretions pass which leave the liver, whether they have their origin in the roots of the hepatic duct or in the gall-bladder; the only exceptions are those concretions that escape by a perforation. Gall-stones in the ductus choledochus, as a rule, completely obstruct the duct, and, so long as they remain impacted, interrupt the excretion of bile; it is only small concretions that permit the bile to flow past them, although this occasionally happens in the case of the larger concretions, when they have an angular form. Concretions may become impacted in the hepatic duct as well as in the cystic; this occurs most frequently at the narrow duodenal portion of the duct, where the calculus not only intercepts the excretion of bile, but sometimes likewise that of the pancreatic juice. The closure of the ductus communis is followed by all the consequences which have already been described—dilatation of the ducts as far as their radical extremities, distention of the gall-bladder, &c.; these lesions being more liable to supervene the longer the occlusion has lasted (See Observation No. XXXIV).

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[1] Morgagni records an observation, where a conglomerate mass of this sort, weighing 2½ ounces, was made up of sixty pentahedral calculi.

Moreover, the concretions not unfrequently give rise to inflammation and ulceration of the duct, ending in perforation into the peritoneal cavity, or into the duodenum (Observation No. XXXIX.); in favorable cases the ulcer cicatrizes, but then as a rule, it leaves behind a stricture or obliteration of the ductus choledochus.

8. *Symptoms arising from Gall-stones.*

a. The symptoms resulting from the presence of concretions in the interior of the liver and in the roots of the hepatic duct are, as a rule, of an indefinite character. They consist in dull pains, which in most cases are limited to the liver, but more rarely radiate to the shoulder of the lumbar region, or over the abdomen, ceasing at times and then recurring. The size of the gland is not essentially altered; jaundice is usually absent, and only supervenes when the larger ducts are closed. At the same time there are usually gastric derangements, slight errors in diet occasioning vomiting or pains in the right hypochondrium. When the irritation of the bile-ducts is more severe, attacks of rigors occur, followed by heat and sweating, which lead to the assumption of intermittent fever, the more readily as jaundice and other hepatic symptoms are absent. In one case that occurred in my practice I tried Quinine for a long time without any benefit, and the cause of the rigors was not discovered until the *post-mortem* examination; numerous calculi, up to the size of a bean, were then found lying in the hepatic duct; the glandular tissue of the liver was unaltered. When ulceration of the ducts, inflammation of the portal vein, or abscesses of the liver occur, the symptoms that usually result from these morbid processes are present.

A certain diagnosis of gall-stones in the interior of the liver, is only possible under favorable circumstances.

b. Concretions in the hepatic duct are attended by similar symptoms to the above, but, when they become impacted, they occasion local pains, with obstruction to the passage of the bile, which is indicated by jaundice and enlargement of the liver, and which can only be distinguished from that caused by closure of the ductus communis, by the absence of distention of the gall-bladder.

c. Calculi may exist for a long time in the gall-bladder, without giving rise to any symptoms whatever.[1] This is particularly the case with small concretions; on the other hand, large or numerous concretions, from inducing catarrh or inflammation of the wall of the gall-bladder, cause pains which are usually of a dull or pinching character, but occasionally are more severe, and radiate towards the epigastrium, right shoulder, lumbar region, or hip. At the same time, the gall-bladder usually becomes distended and appreciable on palpation, from the circumstance of its neck being occasionally closed by the inflammatory tumefaction of the mucous membrane. These symptoms are particularly apt to supervene after violent exertion, riding, driving over rough roads, excesses in diet, &c., and disappear under the influence of rest.

When the ulceration induces perforation, the well-known symptoms of *peritonitis ex perforatione* are developed, for the most part with a fatal result.

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[1] According to my observations, collected in the *post-mortem* room and at the bedside, the gall-stones formed in the gall-bladder rarely give rise to morbid derangements. In most of the cases where they were found in this situation they had occasioned no symptoms whatever during life.

Not unfrequently, by careful local examination, we may convince ourselves of the presence of calculi in the gall-bladder, when the latter is accessible to palpation. The larger concretions may then be felt as hard bodies; and where several are present, we may recognize, both by the sense of touch and that of hearing, a rattling or grating noise resulting from their concussion.[1]

The symptoms are of a much more remarkable character when the calculi escape from the gall-bladder, and enter the cystic duct. Unless the concretions are very small, they meet with obstructions in their passage through the ducts, which are furnished with folds of greater or less strength; the mucous membrane of the ducts is greatly irritated, and painful contractions of the muscular fibres result, constituting symptoms, which are usually known by the designation of "hepatic colic." The colic produced by gall-stones, as a rule, originates in the cystic duct, and only in exceptional cases in the much wider and more easily distended ductus choledochus, in which it is only the duodenal orifice that is wont to offer any obstacles to the passage of concretions.

The symptoms of hepatic colic usually commence a few hours after a meal, about the time that the contents of the gall-bladder are poured into the duodenum, simultaneously with the entrance of the chyle. In rarer cases they are excited by violent contractions of the abdominal muscles from lifting heavy objects, or by mental emotions. Chomel and Fauconneau-Dufresne mention cases where the symptoms of colic came on every month, with menstruation.

As soon as the calculus is forced into the cystic duct, pains are complained of at the margin of the liver and in the epigastrium, which are usually accompanied by nausea and vomiting. These pains are in most cases very severe, and of a boring or burning character, or give the idea as if something were torn in the belly; not unfrequently they extend over both hypochondria, and also radiate towards the back, the right shoulder, the neck, &c. At the same time great restlessness is observed; the patients throw themselves about, and in vain seek relief by changing their posture. In irritable individuals, reflex cramps occur, which may become aggravated into the most violent convulsions, resembling epilepsy.[2] The latter, according to Duparcque,[3] sometimes proceed from the right side, and first show themselves in the form of active movements of the abdominal muscles, which gradually extend downwards to the muscles of the lower extremities, as well as upwards, to those of the chest, neck, and arms. Clonic spasms of the entire right half of the body may arise in this way and lead to loss of consciousness. Weakly persons faint or become delirious in consequence of the severity of the pains. Portal[4] mentions two cases that terminated fatally during the paroxysm of pain, the autopsies revealing no other lesions than the impacted gall-stones.

The vomiting, which usually supervenes at an early stage, expels half-digested food or fluids containing bile; occasionally, it becomes persistent and of dangerous severity. The bowels are usually confined, and the abdomen distended and tympanitic.

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[1] J. L. Petit compared the sound to that produced by striking a bag containing nuts.

The stethoscope may be employed here with advantage.

[2] We have already found that similar symptoms are produced by the irritation of the biliary passages by round worms. See page 183.

[3] *Revue Médicale,* Avril, 1844.

[4] *Maladies du Foie,* p. 170, Observ. C. and E.

On examination, the region of the gall-bladder is found to be tense and hard, and tender upon the slightest pressure, and not unfrequently the contour of the distended gall-bladder can be felt distinctly. (See Observations XXXVI., XXXVII., XXXVIII., XXXIX.). Jaundice is in most cases absent at first, or only slight; as a rule, it does not become more marked until towards the end of the attack, when the calculus fills up the ductus choledochus and forms an obstacle to the passage of the bile.

In several cases that have occurred in my practice, the commencement of the colic arising from gall-stones has been accompanied by a severe attack of rigors,[1] often followed by heat and sweating, the temperature rising to between 37·5 and 40·5 C. (99°.5 and 104°.9 Fahr.) and the pulse to between 92 and 120. These attacks returned at irregular intervals, on each occasion being marked by an increase of the pains, until the expulsion of the stone into the bowel was followed by recovery (See Observation No. XXXV.). Generally speaking, the vascular system does not participate in the excitement arising from gall-stones; the pulse in most cases is small and of normal frequency, often even slower than natural, while more rarely it is accelerated.[2] Exceptional cases occur where the colic is accompanied by violent palpitations of the heart, great pulsation of the abdominal aorta, congestions of the head, epistaxis, &c.

The severity of the colic varies greatly, according to the size, hardness, and roughness of the concretions; and according to the length and width of the cystic duct, the extent to which its valves are developed, and the degree of irritability of the patient. As a rule, the first attacks are the most violent; subsequently the duct is dilated, and the calculus passes through it more easily.

The duration of hepatic colic likewise varies greatly; it may pass off in a few hours, or last for many days. In the latter case it presents remissions, the pains recurring in paroxysms, until at last the duct becomes so far dilated as to permit the calculus to pass. In one instance I observed the exacerbations come on every afternoon, until the concretion appeared broken up in the stools.

The muscular contraction of the gall-bladder and abdominal parietes is not always sufficient to propel the calculus through the cystic duct. Sometimes it remains impacted, and completely closes up the neck of the gall-bladder. Under such circumstances the colicky pains gradually abate, and there only remains a sensation of tightness or pricking; subsequently the gall-bladder undergoes the changes described under the head of *Hydrops Cystidis Felleæ.* Death, however, may take place during an attack of hepatic colic, as we are taught by the observations recorded by Portal, Flandin, Bogros, and Cruveilhier. Violent inflammation, implicating the surrounding tissues and gangrene of the duct, which terminate fatally, are indicated during life by the symptoms of peritonitis, and the latter lesion, according to Bretonneau's observation, by the supervention of sudden collapse

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[1] Budd justly compares this rigor to that produced by the violent irritation of the mucous membrane of the urethra, from the passage of a catheter, bougies, &c.

[2] The statements of authors respecting the character of the pulse in hepatic colic, differ. O. Wolff places great stress in diagnosis upon the slowness of the pulse, and adduces the experience of Coe, Heberden, and Pemberton, in corrobation of his opinion. Dufresne speaks of the pulse as small and frequent; Budd says it is slow or weak. (See Observations XXXV., &c.)

But, again, the calculus, after entering the cystic duct, may return into the gall-bladder, the obstruction to the flow of bile being removed, until a fresh impaction takes place. This explains why in many cases no concretions can be found in the stools, after the cessation of hepatic colic.

d. Concretions in the ductus choledochus usually occasion symptoms of a milder character than those in the cystic duct. After the entrance of the calculus into the ductus communis, the pain abates, and only returns with renewed severity when the concretion reaches the abdominal opening. During the presence of the calculus in this duct, the bile is more or less completely shut off from the bowel, and jaundice makes its appearance, which is the more marked the longer the obstruction lasts. Sometimes the bile flows away along the side of the concretions, when the latter are of an angular form, or so small as not to close up the canal completely, and then the jaundice may be slight, although numerous gall-stones be voided. Moreover, cases are met with where the bile finds its way through conglomerate calculi in the ductus communis, so that the jaundice diminishes in intensity, although the calculus remains impacted (See Observation No. XXXIV.[1]). As soon as the gall-stones reach the duodenum, the painful symptoms suddenly cease, the patients feel as if new-born, the bowels act more readily, the evacuations again become dark, and in a few days the jaundice disappears. If the stools, be now carefully examined, we rarely fail to find the concretions; sometimes we meet with but a single one, at other times, with large numbers. Pujol counted about a hundred which were passed immediately after the termination of the colic.

Weakly persons sometimes recover but slowly. A feeling of depression, pain in the epigastrium, and disordered digestion remain for some weeks before the recovery is complete.

When the occlusion of the ductus choledochus, by means of calculi, is of longer duration, all the consequences of obstructed flow of bile, which have been already described, ensue; the liver enlarges; the ducts, and particularly the gall-bladder, become distended; and the jaundice increases more and more in intensity. This condition may last for months,[2] and even years, until death takes place, or the stone is forced into the intestine. In the latter case a large quantity of bile is suddenly discharged into the duodenum, followed by colic, bilious diarrhœa, and sometimes also bilious vomiting. Under such circumstances the ducts often remain for a long time dilated, and the contractility of the gall-bladder is likewise impaired. As a result of this state of atony of the excretory apparatus of the liver, notwithstanding the free discharge of bile, a large quantity of this secretion accumulates in the gall-bladder until it overflows, or until, in consequence of external pressure, a portion of its contents is forced over into the intestinal canal. J. L. Petit and Cruveilhier have recorded cases of this nature. The patient, whose case is reported by Petit, had severe attacks of hepatic colic, followed by extensive swelling of the gall-bladder, which gradually lost its tenderness and caused little inconvenience. The tumor varied in size, and when large it occasioned a feeling of tension, which ceased as soon as the patient pressed upon it, this manipulation being followed by bilious stools. Sometimes the tumor diminished in size, without external assistance, and then the ordinary condition of obstinate constipation was followed by bilious diarrhœa and griping pains.

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[1] In this case, the greatly dilated ductus choledochus was filled with calculi, and yet scarcely any yellow tint of the conjunctivæ could be discovered.

[2] I once had under my care a lady, twenty-nine years of age, in whom, after repeated attacks of colic, the ductus communis remained closed for seven months. After a protracted use of the springs of Karlsbad, the concretions were discharged, and recovery ensued.

The morbid condition we have been considering does not always progress so favorably. The distended gall-bladder may inflame and attain an enormous size, this increase of size being attended by violent pains and fever. The gall-bladder then usually contracts adhesions to the abdominal walls, or to the intestinal canal, and bursts either externally or internally so as to establish an external or an internal biliary fistula.[1] It may likewise burst into the abdominal cavity, and excite fatal peritonitis.

A case has already been recorded at p. 174, where the gall-bladder threatened to burst into the peritoneum, but where I succeeded in obtaining a cure, by puncturing the greatly distended organ.

9. *Gall-stones in the Intestinal Canal.*

Gall-stones may gain admission to the bowel either from the ductus choledochus or by ulcerative processes taking place after the formation of adhesions between the biliary passages and the intestine. The calculi which take the former course and pass into the bowel amid symptoms of hepatic colic, are usually voided with the stools without causing any further inconvenience; their size is in most cases so small, that they cannot injure the intestinal canal. To this rule, however, there are exceptions, for large concretions may find their way through the dilated ducts; moreover, the calculi may have new layers deposited upon them in the intestinal canal so as to increase in size; and lastly, even small gall-stones may give rise to severe disorders in the appendix vermiformis. On the whole, however, the large concretions, that gain admittance to the intestines, as the result of ulceration, are more dangerous than the former class.

The calculi which are voided with the stools are sometimes solitary, and at other times scattered in large numbers through the fæcal matter, or enclosed in hard balls, or mixed with bilious, or occasionally, with bloody matter. In exceptional cases, only fine dark crumb-like particles, without any definite form, are contained in the stools (Observation No. XLI.), while, on the other hand, very large concretions are occasionally found in the fæces. Walter (*op. cit.* p. 96) long since figured a calculus voided with the stools, as large as a pigeon's-egg, and Petit reported one the size of a hen's-egg, which was passed after protracted colicky pains. How great may be the size of concretions passed from the bowels is shown by the observation of Bernard,[2] who found a mass of polyhedral calculi, rolled up into a ball, as large as two fists. Concretions are not unfrequently passed, indicating the existence of others from their surfaces being ground down.[3] We must not, however, on the other hand, conclude from the passage of a rounded or warty calculus, that no others will follow. I have repeatedly known large numbers of such rounded or warty calculi, up to the size of a hazel-nut, voided after one attack of colic.

In rare cases the calculi pass from the duodenum up into the stomach, and are then vomited. Morgagni,[1] Fr. Hoffmann,[2] Portal,[3] Bouisson,[4] and others, have reported observations of this nature. The vomited matter, which, as a rule, was of a bilious character, contained single, or occasionally several, even as many as twenty, concretions, while, occasionally, others were at the same time voided with the stools. This vomiting was always preceded by unusually severe colicky pains.

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[1] See further on, under the head of Biliary Fistulæ.

[2] *Lancette Française*, 27 Févr., 1834.

[3] See Van Swieten (*Comment.*, T. III., p. 151, § 950). Leo and Pleischl, *Merkwürdige Krankheitsgeschichte einer Gallensteinkranken*, Prag., 1826.

10. *Derangements caused by Gall-stones in the Intestinal Canal.*

Large concretions entering the bowel, either through the ductus communis or by perforation, occasionally encounter obstacles in their further progress, especially when their size is increased by the deposit of fæcal matter. Ultimately they close up the channel of the intestine and lead to ileus. Vomiting supervenes, and gradually becomes stercoraceous; the bowels cease to act; the abdomen becomes tympanitic; the features are pinched, and in a short time all the symptoms of internal incarceration are developed, which either terminate in death, or, after the expulsion of the concretion, in recovery. The stone in most cases remains impacted in the jejunum, more rarely in the ileum; in the large bowel it is only the sphincter that is wont to offer any obstacle. I have observed two cases of this description, one of which terminated in recovery (Observation No. XLII.) and the other in death. Broussais, Monod, Mayo, Thomas, Vander Byl, Oppolzer, and others, have reported observations of the same sort.[5] Gall-stones may be arrested in the cæcum and appendix-vermiformis, and give rise to ulceration and perforation in these localities, lesions of a similar nature to those which are known to result from other foreign bodies, such as cherry-stones, splinters of bone, dried fæcal matter, &c.

11. *Biliary Fistulæ.*

Inflammation of the gall-bladder resulting from gall-stones, after generating adhesions to the abdominal walls, may cause the organ to open externally, and discharge in this way its contents—bile, pus, or serous fluid and calculi. The rupture does not always take place at the spot exactly corresponding to the situation of the fundus of the gall-bladder, but often at a considerable distance from this locality,—at the umbilicus, to the left of the linea alba, in the neighborhood of the ileum, in the inguinal region, &c.; long, and sometimes tortuous fistulous passages, may then exist between the gall-bladder and the external opening. Several openings are frequently formed, through which the contents of the gall-bladder ooze away. The calculi that escape in this way are not unfrequently large and numerous, and they may increase still more in the interior of the fistulous passages, where they are frequently arrested for a long time, so as to attain to the size of a hen's-egg. The quantity of bile that flows away is usually slight, because the fistulæ contract powerfully, even when a large stone has passed through them. Accordingly, this loss has little effect upon the nutrition. Dassit,[1] however, observed that the appetite of his patients was extraordinarily increased, just as is observed in the case of animals with artificial biliary fistulæ. The fistulous passages close up readily or with difficulty, according to the quantity of bile that flows away through them; they may last for years and discharge fresh concretions from time to time.

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[1] *De Sedibus et Causis Morborum.* Epist. XXXVII.

[2] *Med. Rat.*, T. VI., p. 44.

[3] *Maladies du Foie*, p. 275.

[4] *Loc. cit.*, p. 203.

[5] See Fauconneau-Dufresne, *loc. cit.*, p. 268; *Medico-Chirurgical Transactions*, Vol. VI.; *Transactions of the Pathological Society*, Vol. VIII.; *Zeitsch. d. Gesellschaft d. Aerzte in Wien*, Nov., 1860.

Most of the recorded cases have terminated in recovery; a few have proved fatal, from other lesions of the liver, induced by the gall-stones, from suppuration of the abdominal walls, &c. Fauconneau-Dufresne (*loc. cit.*, p. 300) has collected nineteen observations of biliary fistulæ; Walter mentions three cases; and, more recently, several have been recorded by Oppolzer (*Zeitschr. der Gesellsch. der Aerzte in Wien*, November, 1860), and by many others.

In addition to the fistulæ opening externally, other abnormal communications are met with between the biliary passages and internal organs. Most of the latter fistulæ lead from the gall-bladder or the ductus choledochus into the duodenum, and they vary in width, according to the size of the calculus which has passed through them. The ulceration, to which these fistulæ are owing, may not betray any symptoms during life. The pains, vomiting, and other symptoms which are observed, are of so indefinite a character that it is impossible to base a certain diagnosis upon them. In one of my cases I observed bloody stools (Observation No. XXXIX.), while in another the existence of the morbid process was not betrayed by a single symptom (Observation No. XL.).

The pathological importance of these fistulæ is slight.

Fistulous communications between the gall-bladder and stomach are much less common. Examples are mentioned by Baillie and Weber which these observers regarded as congenital. Oppolzer met with a case where the opening was found close to the pylorus.

An observation published by Fauconneau-Dufresne of a fistulous communication between the gall-bladder and colon, was not a simple case of gall-stones, being complicated, from the gall-bladder being in a state of cancerous degeneration.[2]

In exceptional cases, a fistula is formed between the gall-bladder and the urinary passages on the right side. Faber[3] has recorded the history of a female who voided nine small and four large gall-stones with the urine, without having exhibited any symptoms of a remarkable nature, except pains in the urinary bladder. The urine was of a green color, and, according to careful analysis made by Gmelin, contained bile-pigment; there was no jaundice.

Lastly, the communications that may be developed between the biliary passages and the portal vein remain to be mentioned. Realdus Columbus[4] found three gall-stones in the portal vein of Ignatius Loyola, the founder of the Order of the Jesuits, which had forced their way from the gall-bladder into the trunk of the portal vein. Jacob Camenicenus[1] relates the case of a man who suffered for a long time from jaundice, and afterwards from dropsy; the branches of the portal vein were found entirely filled with calculi, which were black externally and yellow in their interior; a similar concretion was found in the ductus choledochus. F. Deway[2] has recently published a remarkable observation of this sort. The case was that of a female, 67 years of age, who had a lingering attack of intermittent fever, and afterwards suffered for seven years from jaundice and obstinate constipation; the hepatic dulness was diminished; at the lower margin of the ribs on the right side there was persistent pain, which was not increased by pressure; the skin was bronze-colored; the pulse was 55; the urine was green, and during the last three days of life was entirely suppressed. Death took place by exhaustion. The liver was found to be small, greenish-brown, and soft; the gall-bladder was shrivelled up and contained a calculus, weighing three grammes (46¼ grs. Troy); the cystic duct and the ductus choledochus were converted into fibrous cords. The portal vein, which was double the width of the inferior vena cava, contained a hard concretion, 2·13 centimètres (10 Eng. lines) in length, which was friable, black externally, and brownish in its interior, and composed of concentric layers, between which small white crystals were deposited. On analysis it was found to consist of cholesterine, pigment, stearine, a green resinous substance, picromel, and salts of magnesia, or, in other words, the ordinary constituents of gall-stones. Other small cylindrical bodies were found in the branches of the portal vein. The spleen was softened, and about three times its normal size.

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[1] *Bulletin Générale de Thérapeutique*, 15 et 30, Sept., 1839.

[2] For references to numerous additional instances of fistulous communications between the gall-bladder and the stomach, duodenum, colon, peritoneum, and external surface, the reader is referred to a memoir on "Gastro-Colic Fistula," by the Translator, in the *Edinburgh Medical Journal* for July, 1857.—TRANSL.

[3] *Heidelberger med. Ann.*, Bd. V., Heft 4; Schmidt's *Jahrbücher*, 1840, Heft 37, s. 48.

[4] Bianchi, *Historia Hepatis*, Vol. I., p. 191, Genevæ, 1725.

I cannot participate in the ordinary view, according to which these concretions are thought to have been generated in the blood of the portal vein, owing to its saturation with biliary matter, because on such a supposition the composition of the calculus ought to have been different; fibrin and blood-pigment could not have been absent, if the deposit had taken place from the blood. Moreover, bile, when it is absorbed, passes into the hepatic veins, and not into the portal vein.

The calculus in this case, as in that recorded by R. Columbus, passed from the biliary passages into the portal vein.

12. *Diagnosis of Gall-stones.*

The diagnosis of gall-stones is easy or difficult, according to the severity of the derangements that they excite in the liver and its excretory apparatus.

They remain almost always latent, so long as they are confined to roots of the hepatic duct, and thence they may pass through the ductus communis into the intestine without causing any uneasiness whatever. Accordingly, we sometimes find gall-stones in the evacuations when their existence has not been suspected.

Concretions in the gall-bladder likewise remain for the most part latent, until they become so large and numerous as to be felt through the abdominal parietes, or until they enter the cystic duct, and, by advancing through it and the ductus choledochus, give rise to the symptoms of hepatic colic. The clinical features of hepatic colic, when perfectly developed, cannot be confounded with those of any other affection. The seat of the pain in the right hypochondrium, for the most part at the spot corresponding to the gall-bladder, which may often also be felt as a smooth, rounded tumor; the circumstance of the pain commencing a few hours after a meal; its severity, and the reflex phenomena excited by it, such as vomiting, rigors, &c.; the small slow pulse, and especially the jaundice—constitute a series of symptoms such as only result from gall-stones.[1]

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[1] Phœbus, *De Concrementis Venarum Osseis et Calculosis*, Berol., 1832, p. 44.

[2] *Gazette Médicale de Paris*, 1843, No. 17; Schmidt's *Jahrbücher*, 1844, Heft 3.

Jaundice, however, is frequently absent, and then it is possible to confound the affection with cardialgia. Such mistakes are best avoided by a careful examination of the stomach and liver. In the case of gall-stones we seldom fail in discovering tenderness, or a feeling of resistance in the region of the gall-bladder, and a globular tumor may be felt more commonly than is usually supposed. Moreover, the seat of the pain is less in the epigastrium than in the hypochondrium; the pain does not commence immediately after eating, as is the case with cardialgia, but not for several hours after; and lastly, the slighter extent to which the digestion is deranged by gall-stones is to be borne in mind.

Under certain circumstances the jaundice resulting from distention of the colon may simulate gall-stone disease, as is shown by Observation No. XLIII. Careful examination of the hepatic region, however, will enable us without difficulty to distinguish, by their form and consistence, scybala in the colon from distention of the gall-bladder.

We shall consider further on the possibility of confounding the colic arising from gall-stones with mere *neuralgia hepatis.*

13. *Prognosis.*

The prognosis in cases of gall-stones follows from what has already been said respecting the progress of the disease. Although the great majority of cases run a favorable course, notwithstanding the severity of the symptoms, it must not be forgotten that many dangers, by no means trifling, threaten life from the first, and that apparently simple cases may suddenly take an unfavorable turn. Moreover, we must always be prepared for relapses, because gall-stones are very rarely passed only once. On the other hand, experience has shown that even very tedious and serious cases of this disease may recover, and consequently we must not give up all hope of cure too soon. Van Swieten and Portal (*loc. cit.*, p. 177) have recorded observations of this nature. I have myself seen a young lady who had repeated relapses and jaundice for seven months, but who ultimately recovered completely at Karlsbad.

14. *Treatment of Gall-stones.*

There are two main indications to be carried out in the treatment of gall-stones:—

1. To remove the colic and the other derangements produced by the concretions.

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[1] Perfect certainty of diagnosis is arrived at by the discovery of concretions in the stools. Accordingly, we ought to examine the evacuations with great care, and not be led astray by the advice frequently given to search for gall-stones as floating bodies, after the addition of water. Mere inspection often suffices; but, when necessary, we must wash the fæces through a sieve.

2. To get rid of the concretions remaining in the biliary passages, and to prevent the formation of fresh ones.

As a rule, the treatment of the hepatic colic is the first thing that we have to attend to, and here the question is, how to moderate the pains and set free the impacted calculus. These objects are best attained by means of narcotics, especially Morphia or Opium, which are to be given in moderate doses; in case the vomiting is so urgent as not to allow of their being retained in the stomach, they may be administered by the rectum. Chloroform inhalations, repeated from time to time according to circumstances, are adapted to the more urgent cases; while, on the other hand, Belladonna and allied remedies[1] are suitable in the milder and more protracted cases. At the same time the abdomen should be covered with warm cataplasms, or, when circumstances permit, the patient ought to have a tepid bath and remain in it for a long time.[2] After warmth had been tried without any benefit, Bricheteau ,obtained good results from bladders of ice, with which he covered the epigastrium and the corresponding part of the back. When the vomiting is very urgent, benefit may be derived from sucking little pieces of ice, from the Pulvis Aërophorus,[3] Seltzer water, or small quantities of champagne.

When the pulse is weak, or when there are rigors, cold extremities, or a tendency to syncope, we must cover the patient with warm clothing, and administer Ether, Wine, the Liquor Ammoniaci Anisatus,[4] and similar stimulants. General spasms of a reflex nature are to be treated in a similar manner, or with chloroform inhalations administered with due caution.

In full-blooded patients, with great excitement of the heart's action, congestions of the head, &c., venesection is necessary before having recourse to sedatives. In many cases general abstraction of blood suffices to overcome the spasmodic grasping of the concretion; venesection, however, must not be employed, as has occasionally been recommended, as the ordinary remedy for effecting this object.

Great tenderness in the region of the gall-bladder, or over the entire liver, constitutes an indication for local abstractions of blood by cupping or leeches.

After the pain has been alleviated, mild purgatives, such as the Bitterwassers of Friedrichshall or Saidschutz,[5] Castor-Oil, Compound Infusion of Senna, &c., are best suited for promoting the advance of the calculus; they are the most effectual means for assisting the passage of the bile and of the concretion into the intestine. Saunders particularly recommends for this object Calomel with Scammony and Rhubarb; Pujol, the Sulphate of Soda; and Bouchardat, Castor-Oil, in doses of a teaspoonful every half-hour; but it is doubtful if any great difference exists between one form of purgative and another.

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[1] Saunders and Craigie recommend Tobacco enemata.

[2] Portal allowed his patients to fall asleep in the bath while the warm water was renewed from time to time.

[3] The *Pulvis Aërophorus Laxans vel Anglicus* is the same as Seidlitz powder.—TRANSL.

[4] See Vol. II., p. 92, *note.*—TRANSL.

[5] The springs of Friedrichshall are situated four miles from Cobourg, in the Duchy of Saxe-Meiningen. Liebig found in sixteen ounces of the water 194·261 grains of solid matter, of which the principal ingredients were the sulphates of soda, magnesia, and lime, and the chlorides of sodium and magnesium.

The springs of Saidschutz and Seidlitz are both in Bohemia, on the road between Toeplitz and Kursaal. They contain nearly 300 grains of solid matter in the pint. Sulphate of magnesia is greatly in excess of the other ingredients, and the next in importance is sulphate of soda.

The *Bitterwassers* of Friedrichshall and Saidschutz may be said to be sulphated saline springs.—TRANSL.

Emetics are still more effective than purgatives, in assisting the passage of the calculus through the bile-ducts. They may easily, however, become a source of danger by causing rupture or inflammation of the ducts, and hence Morgagni, Portal, Pujol, and others, long since enjoined caution in using them. A preferable practice is to administer Potassio-Tartrate of Antimony, in nauseating doses, as was recommended by Saunders.

After the removal of the hepatic colic and its immediate consequences, the second indication of treatment is to get rid of the remaining concretions, and prevent the formation of fresh ones.

Remedies for dissolving gall-stones have at all times been sought after. F. Hoffmann believed that he had discovered such a remedy in the fixed alkalies, whilst Bianchi and Van Swieten confessed that their trials of these remedies had failed. But the remedy of Durande is the one that obtained the most extensive reputation for the object in question. It consisted of a mixture of three parts of Sulphuric Ether and two parts of Oil of Turpentine, of which four grammes (about one drachm) was to be taken every morning, until 500 grammes (about 16 Troy ounces) in all had been consumed. By this remedy 20 cases of gall-stone-colic were treated successfully, and the mixture has remained in use down to the present day.

Thénard (*Traité de Chimie*, T. III., p. 636), however, showed that this remedy could not dissolve concretions in the biliary passages, and rightly referred its effects to the antispasmodic action of the Ether. Durande's remedy, moreover, is rarely tolerated, and accordingly Sömmering has recommended the administration of the Ether only with yolk of egg, and Duparcque, Ether with Castor-Oil.

The best plan is to avoid the remedy altogether, because its solvent action is worth nothing, and as an antispasmodic it is surpassed by Morphia, &c.

But that gall-stones can be dissolved in the gall-bladder and the ducts of the liver, has already been stated, and in the Frontispiece, Figs. 19 and 20, concretions are represented, exhibiting traces of commencing erosion. The conditions under which a solution of the calculus is brought about, vary according to the nature of the external crust. Cholesterine and the compound of cholepyrrhin and lime, which are its most important constituents, and likewise the mucus and cholate of lime may be dissolved by very alkaline bile; but this will produce no change upon a crust composed of carbonate of lime. Moreover, bile of a thin, watery character may loosen the stones, dissolve their connective material, and so lead to their mechanical destruction or comminution.

Hence the reason is intelligible, why Hoffmann's idea of employing alkalies in the treatment of gall-stones has again come to prevail, more particularly in the form of the alkaline mineral waters of Karlsbad, Vichy, Ems, Marienbad, Eger,[1] &c., which, as is shown by experience, produce a copious secretion of bile.

These mineral waters have certainly proved the most efficacious remedies against gall-stones. In many severe cases I have directed my patients to go to Karlsbad, and have known them to return cured. Some of these patients, whom I saw as consulting physician, I had only an opportunity of watching for a brief period as they came from distant countries. In other cases I have known favorable results ensue, under my own eyes, from drinking the water brought from the Millspring of Karlsbad, either cold or warm. French physicians, and more particularly Fauconneau-Dufresne, speak in similar terms of Vichy.

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[1] See Vol. I., pp. 42, 88, and 220, *notes*.—TRANSL.

The result, however, must not be mainly referred to the solvent action of these springs. The concretions are not dissolved to any great extent; most of them are voided unchanged under all the symptoms of hepatic colic; they are propelled by the current of the bile, the quantity of which is increased. It is a question for the medical men at Karlsbad and Vichy to determine more accurately than has hitherto been done, in what form gall-stones are voided under the use of these springs, whether unchanged, or eroded, or comminuted.

If we have to choose from among the mineral waters above mentioned, Karlsbad and Vichy stand pre-eminent as the most efficacious; the former is to be preferred when the gall-stones are unaccompanied by obstinate constipation; Ems is to be recommended to very irritable, debilitated patients, suffering from a tendency to diarrhœa; Marienbad, on the other hand, is more adapted for plethoric individuals with a disposition to congestions. In suitable cases tepid bathing may be combined with the drinking of the waters.

The Bicarbonate of Soda, taken either by itself or in combination with Sulphate of Soda, is less efficacious than the mineral waters, because it is more apt to derange the digestion. When we have recourse to it, it ought to be given very diluted. In this form it is best tolerated, and, moreover, the imbibition of large quantities of water, which is taken up into the portal vein and increases the amount of bile, is by no means without effect upon the successful issue[1] of the case.

Bouchardat has recommended the vegetable-acid salts of the alkalies, such as the acetates, citrates, &c., in place of the carbonates. In protracted cases, instead of giving salines, it is advisable to add to the Carbonate of Soda, Rhubarb, Aloes, or similar medicines which are less likely to disorder the digestion.

Decoctions of herbs, which owe their effects mainly to the proportion of vegetable-acid salts in their expressed juices, are apt to derange the stomach, and consequently must only be employed when the functions of this organ are unimpaired. The Grape-cure is less objectionable on this account.

Much benefit is not to be expected from the employment of the bitter extracts which were so much esteemed by the ancient physicians, such as the Extractum Taraxaci, Ext. Graminis, Ext. Chelidonii, Ext. Cardui Benedicti,[2] &c., or from the gum resins of Asafœtida, Ammoniacum, &c. The doses of these extracts are too small to produce any powerful effects; they are only efficacious when taken in large quantities in the freshly expressed state.[3]

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[1] According to the observations of Bidder and Schmidt, an increased ingestion of water is followed by an augmented secretion of thin bile. Vanotti believes that he cured a case of gall-stones by the simple drinking of large quantities of water.

[2] See p. 155.

[3] It may likewise be mentioned that Hall of Philadelphia, in the year 1821, stated that he had cured gall-stones by means of electricity. The indications for surgical interference in cases of gall-stones have been pointed out already, under the head of Diseases of the Gall-Bladder.

In order to prevent the formation of fresh gall-stones a carefully regulated diet, active and passive exercise in the open air,[1] and regular action of the bowels by the administration, when necessary, of the neutral salts, Rhubarb, &c., are indispensable.

A course of the solvent mineral waters of Karlsbad, Marienbad, or Kissingen, or the Grape-cure is to be resorted to from time to time, when we desire to prevent with still greater certainty the fresh formation of gall-stones.

By way of further illustration, a few cases of Gall-stone Disease, that have occurred in my own practice, may be here recorded.

15. *Illustrative Cases.*

OBSERVATION No. XXXV.

Cardialgic Pains and Jaundice.—Relapse.—Broncho-catarrh.—Pains in the Epigastrium and Right Hypochondrium.—Aggravation of the Pains, accompanied by Rigors and Elevation of Temperature after Meals, in the form of a Pseudo-intermittent Fever.—Passage of fragments of a comminuted Gall-stone.—Cessation of the Pains and Rigors.—Recovery.

Friederike Bielefeld, aged 25, maid-servant, was under treatment in the Medical Clinique in the Charité Hospital, at Berlin, from the 25th of February to the 13th of March, 1861.

She had formerly suffered a great deal from cramp in the stomach, but during the two years prior to admission had been free from it.

In January, 1861, she was seized with jaundice, which, however, rapidly disappeared.

On the 19th of February pains came on in the præcordial region, accompanied by a feeling of great weakness; the bowels were confined, and the stools deprived of their color; the jaundice had returned.

On the 24th of February she came to the Hospital, having had a rigor the day before.

The patient was well-nourished; the color of her skin was dark-yellow. She complained chiefly of cough, bad appetite, and pains in the head.

On examining the thorax nothing abnormal could be discovered, except the signs of broncho-catarrh.

The hepatic dulness commenced at the upper margin of the sixth rib, and amounted to five inches in the parasternal line, seven inches in the mammary line, and six inches in the axillary line. The epigastrium yielded a muffled sound; percussion here caused great pain, as it did likewise in the left side, where the hepatic dulness was continuous with that of the spleen. Slight pressure in the epigastrium produced acute pain, which sometimes also came on spontaneously, and radiated from the epigastrium towards the fissure of the liver on the right side. There were likewise slight pains in the soft parts of the right shoulder. The urine contained a large quantity of bile pigment, and some albumen. The stools were perfectly colorless.

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[1] Musgrave observed a case in which gall-stones that had caused protracted jaundice, were set free after violent riding.

On the morning of the 25th of February the temperature was 37°.5 C. (99°.5 Fahr.) and the pulse 92. At 2 o'clock in the afternoon a rigor came on, accompanied by acute pains, extending over the epigastrium and both hypochondria. The hepatic region was very tender when touched; the temperature rose to 40°.5 C. (104°.9 Fahr.) and the pulse to 120, and the respiration from 20 to 40; the heat of skin lasted about ten hours, and was followed by moderate perspiration and sweating.

Citrate of Potash with Bitter Almond Water, an Enema, and warm cataplasms to the region of the liver, were prescribed.

On the morning of February 26th the temperature was 37·8 (100° Fahr.), and the pulse 96. The patient had one gray stool; the tongue was covered with a gray coat; the urine was dark-brown; the right hypochondrium was very tender on pressure. At 3½ P.M. the patient had a severe rigor, with a fresh aggravation of the pains in the liver. The rigor lasted 20 minutes, and was followed by heat and sweating, which continued for six hours.

Lemon Juice was ordered as a drink. Cupping-glasses were ordered to be applied over the right hypochondrium, and to be followed by warm cataplasms.

On the 27th of February the temperature was 37°.2 C. (98°.96 Fahr.), and the pulse 94. The pains had ceased, and the patient had one semifluid gray evacuation. At 1½ P.M. there was a fresh rigor; the temperature was 39°.5 C. (103°.1 Fahr.), and the pulse 104. There was some cough with catarrhal expectoration.

On the morning of the 28th of February the temperature was 37°.7 C. (99°.8 Fahr.) and the pulse 96; the pains were less severe. About 4 o'clock in the afternoon, without any rigor or heat, slight sweating set in, which lasted a quarter of an hour. The temperature in the evening was 38° C. (100°.4 Fahr.), and the pulse 96.

On the 1st of March the temperature was 37°.5 C. (99°.5 Fahr.), and the pulse 72. The hepatic region was less painful, but there was no change in any of the other symptoms. No rigor or elevation of temperature occurred. Bicarbonate of Soda was prescribed.

On the 2d of March the temperature was 36°.1 C. (96°.98 Fahr.), and the pulse 60. The patient complained of dragging pains in the epigastrium. The stools were gray, and were found to contain numerous splinters of a round gall-stone, presenting a radiated structure, and consisting of cholesterine and of the combination of cholepyrrhin with lime. Three hours afterwards stools tinged with bile were passed.

On March 3d the temperature was 37° C. (98°.6 Fahr.) and the pulse 56. The pains in the hypochondria and epigastrium had ceased, except that there was still some tenderness on pressure over the region of the gall-bladder. The skin and likewise the urine appeared paler.

On March 5th the stools were solid and colored with bile, and presented nothing abnormal. The gall-bladder was only painful on firm pressure. The margins of the liver had receded about an inch.

The bowels were still confined, and required to be kept regulated by the *Bitterwasser* of Friedrichshall [1] and lenitive electuary. The pain, which was still present in the hepatic region on taking a deep inspiration, ceased after the bowels had been freely moved. The yellow color, especially of the conjunctivæ, passed into a greenish tint, and ultimately disappeared, so that on the 13th of March the patient was discharged cured.

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[1] See p. 214, *note*—TRANSL.

OBSERVATION No. XXXVI.

Disordered Digestion.—Jaundice.—Pains in the Epigastrium and Right Hypochondrium.—Liver enlarged and tender.—Gall-bladder distended.—Passage of two crystalline Calculi of Cholesterine, followed soon by Bilious stools and Recovery.

Heinrich Günther, aged 43, a journeyman-joiner, was under treatment in the Medical Clinique at Breslau from the 27th of June to the 29th of July, 1856.

Until four weeks before admission this patient had always enjoyed good health. About this time he first observed a slight jaundiced tint of the face, which after a few days increased and became developed into well-marked jaundice. At the same time the patient began to suffer from loss of appetite and from constipation, alternating with diarrhœa. The stools presented a clay-like appearance.

At the time of admission there was intense jaundice; on the extremities, in addition to the yellow color of the skin, isolated ecchymoses were observed, together with numerous varicosities.

The derangements of the digestive functions continued, and at the same time there was violent headache; pressure over the epigastrium and right hypochondrium was extremely painful. The surface of the liver was smooth and the hepatic dulness measured 15 centimètres in the parasternal line, 19 in the mammary line, and 14 in the axillary line (about 6, 7½, and 5½ Eng. inches). The margin of the liver was felt to be sharp; and below this margin, on the right of the umbilicus, a globular, elastic, movable, painful tumor was discovered. The skin was partially covered with scales of epidermis. The patient complained of burning sensations and itchiness over the entire body. The urine was copious, of a dark-green color, and presented distinctly the reaction of bile-pigment. Infusion of Rhubarb was prescribed.

The bowels were not opened for three days after admission, when two clay-like stools were passed after the administration of Aloes. The remaining symptoms exhibited no change, except that the headache had somewhat abated.

On the 3d of July there was less itching of the skin; the urine was the same as before. The liver was still very tender. Decoction of Colocynth was prescribed.

On July 6th, two stools. The gall-bladder could be distinctly felt projecting an inch and a-half beyond the margin of the liver. The temperature was 38°.7 C. (101°.66 Fahr.), and the pulse was 84.

July 11th; for the two preceding days there had been some fall in the frequency of the pulse, which varied from 64 to 72. The stools presented here and there colored layers, and contained two concretions of cholesterine with crystalline surfaces. The jaundice was fading, but the urine was still dark-brown. The headache had ceased, and there was some appetite; the tongue was still slightly coated. The patient slept badly in the night. There was no elevation of the temperature.

On July 12th the patient had three stools after taking Decoction of Colocynth. The jaundice continued to fade; the appetite was improved. The urine was less deeply colored, but still yielded the reaction of bile-pigment. The temperature was 35°.8 C. (96°.4 Fahr.).

The patient's state rapidly improved, while at the same time the jaundiced tint disappeared from the skin and the bile-pigment from the urine. His appetite returned; the bowels became regular, and the stools colored with bile, and on the 29th of July he was discharged quite recovered. The liver had receded to its normal dimensions. The gall-bladder could no longer be felt.

Observation No. XXXVII.

Violent Periodic Pains in the Gall-bladder with Nausea and slight Jaundice.—Gall-bladder distended and tender upon pressure.—Violent Paroxysm rapidly passing off, without any increase of the Jaundice, and without the passage of a Gall-stone.—Occlusion of the neck of the Gall-bladder by a Concretion.

Emilie Haupt, aged 32, wife of a shoemaker, was under treatment in the Medical Clinique, at Breslau, from the 3d to the 17th of July, 1854.

This woman was somewhat hysterical, and had suffered fourteen days before admission, from violent pains in the loins and region of the liver, accompanied by nausea and constipation. She was slightly jaundiced, and she stated that, prior to admission, she had been of a citron-yellow color.

These symptoms dated from a disease, with which the patient had been afflicted eight weeks before, and which had been designated inflammation of the liver and abdomen.

Close to the outer margin of the right rectus abdominis muscle a tumor could be felt, the size of a duck's-egg, and rounded inferiorly. This tumor was tense and painful, and could be traced upwards below the margin of the liver. At this spot the patient often experienced pricking pains, coming on suddenly. The appetite was very bad; the stools were moderately brown; the urine contained traces of bile-pigment. Infusion of Rhubarb with Extract of Belladonna and Ether was prescribed.

During her stay in Hospital the attacks of pain often alternated with complete intermissions.

On the 14th of July a severe paroxysm occurred, accompanied by greenish vomiting and likewise by rigors; the temperature rose to 39°.5 C. (103°.1 Fahr.) After the employment of Morphia and warm cataplasms the patient soon improved, and in a few days had so far recovered as to wish to be discharged. There was no alteration in the color of the fæces, nor any increase of the jaundice, either during or after the paroxysm; and no gall-stone was passed with the motions. The tumor was less tender and somewhat smaller when the patient left the Hospital, but in other respects it was unchanged.

Observation No. XXXVIII.

Signs of advanced Tubercle of both Lungs.—Tight-lace Furrow of Liver; Gall-bladder as hard as a stone; but no derangement of functions of Liver.

Autopsy:—Vomicæ and Tubercular Infiltration of the apices of both Lungs.—Tight-lace Fatty Liver.—Adhesions between the Gall-bladder and Pylorus.—Gall-bladder containing about a hundred Gall-stones; its mucous membrane smooth and covered with black Cicatrices.

Caroline Nass, aged 63, widow of a pin-maker, was a patient in the Medical Clinique at Breslau, from the 28th of November to the 12th of December, 1855.

The patient had suffered some years from a cough, but had never expectorated any blood. She had never presented any symptoms indicative of disease of the organs of digestion, or of the liver in particular. At the time of admission she was emaciated and prostrate, and both feet were œdematous. There was loud bronchial breathing with slight dulness at the apices of both lungs; the sputa were purulent, and confluent, and contained elastic fibres and pigment granules. A rounded, flat, somewhat movable body, with a smooth surface (which was a portion of the liver, partly detached from the right lobe by a tight-lace constriction) could be felt in the right hypochondrium, especially when the patient lay on the left side, and in front of this in the fissure of the liver was an oval, movable, very hard body, corresponding in form to the gall-bladder. There was no jaundice; the appetite was slight; the stools were normal. Pulse 110, small, and soft.

By means of Wine, Coffee, Soups, Quinine, the Ammonium Muriaticum Ferruginosum, the Liquor Ammoniaci Anisatus,[1] &c., the exhausted patient was kept alive until the 13th of December.

Autopsy, 20 *hours after death.*

Brain and its membranes perfectly normal, with the exception of slight opacity of the dura mater.

The mucous membrane of the larynx and trachea was pale; that of the bronchi was somewhat reddened. Both lungs were adherent at their apices. At the upper and back part of the left lung, there was a cavity, the size of a pigeon's-egg, with firm, callous walls, and dirty-gray contents. Further down, were several cylindrical dilatations of the bronchi, and some portions of the pulmonary tissue infiltrated with recent tubercle.

The right lung contained at its apex a cavern, the size of a goose-egg, traversed by trabeculæ and provided with saccular dilatations. The parenchyma surrounding this cavity was dense, loaded with black pigment, and contained several cylindrical dilated bronchi; lower down, were masses of grayish-yellow infiltration. Both lower lobes were congested and œdematous.

The pericardium contained a little serum; the size and muscular tissue of the heart were normal; and the mitral valves were slightly thickened.

The mucous membrane of the stomach, along the great curvature, was of a livid hue, and presented several hæmorrhagic erosions.

In the small intestine, near the ileo-colic valve, were a few shallow tubercular ulcers, not larger than a lentil; and beyond the valve, in the cæcum and ascending colon, were several irregularly-formed ulcers, with reddened, serrated margins and an uneven base. The spleen was anæmic, small, and tough.

A portion of the right lobe of the liver was semi-detached by a deep transverse furrow; its parenchyma was fatty. The gall bladder was connected to the pylorus by a loose band of adhesion; its walls were thickened; it was filled with about a hundred brown concretions; a large white calculus lay impacted in its neck. The mucous membrane of the gall-bladder presented a serous aspect, and was covered with cicatrices containing pigment.

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[1] The *Ammonium Mur. Ferrug.* is the hydrochlorate of ammonia and iron. For the composition of the *Liq. Am. Anis.*, see Vol. II., p. 92.—TRANSL.

The kidneys and genital organs presented no abnormal change of any importance.

OBSERVATION No. XXXIX.

Repeated attacks of Rigors, without any periodic character.—Jaundice.—Hæmatemesis.—Pains in the Epigastrium and in the Right Hypochondrium.—Moderately large Liver, with sharp margins, and tender upon pressure.—Pale, unfrequent, and subsequently Bloody Stools.—Disappearance of the Jaundice.—Exhaustion.—Death.

Autopsy:—Dense, somewhat Granular Liver, with Dilated Bile-ducts.—Perforating Ulcer of the Ductus Choledochus opening into the Duodenum.—Obliteration of the Neck of the Gall-bladder.—Dark Gall-stones in the Gall-bladder.—Mucous membrane of the Stomach and Intestines livid, but free from ulcers or cicatrices.

Christian Bischof, aged 72, laborer, came into the Medical Clinique at Breslau, on October 31st, 1855, and died on December 10th.

The patient stated that, with the exception of an attack of intermittent fever in former years, he had always enjoyed good health. During the eight days before admission he had five attacks of rigors, without any definite type, and for four days he had been jaundiced, and had vomited dark-brown matter, without any antecedent gastric symptoms. The bowels were usually somewhat confined. His principal complaints were great giddiness and pains in the right hypochondrium. Pulse 120; respirations 40; skin dry and of a citron-yellow color. The urine contained bile-pigment and albumen, and deposited lithates. There was pain at both sides of the umbilicus and in the epigastrium, which was increased by pressure. The hepatic dulness in the right mammary line amounted to 17 centimètres, and in the parasternal line to 12 centimètres (6·69 and 4·72 Eng. inches). The liver was tender on pressure; its surface and margin felt smooth. The spleen was moderately enlarged. The heart's sounds were feeble, but free from bruit. On the administration of Quinine the rigors ceased at the end of two days, but the jaundice became more intense.

On the morning of the 4th of November the patient had a slight rigor, lasting for half an hour, and followed by heat; great apathy; no sleep. The margin of the liver was very painful. The bowels were confined, and the stools pale. The urine was copious, and contained no albumen. Muriatic Acid was prescribed.

On the 5th of November pulse 76; urine dark-brown and again albuminous. In the afternoon had a rigor lasting for half an hour, and followed by heat without sweating. Pulse 96. Great prostration. Infusion of Cinchona and Muriatic Acid were prescribed.

November 8th, no rigor since the 5th. Urine less dark; skin paler; stools brown; great thirst; no appetite whatever.

From the 11th to the 15th of November the intestinal evacuations were again black; the urine was alkaline and contained less pigment; the liver continued to be tender on pressure, but there was no change in its dimensions. The patient, however, became weaker and weaker; collapse set in, which, notwithstanding every means employed to counteract it, rapidly became extreme. Death took place on the 10th of December.

Autopsy, 18 *hours after death.*

The brain and its membranes presented no abnormal appearance of any importance, with the exception of a thin hæmorrhagic layer upon the inner surface of the dura mater.

The mucous membrane of the pharynx and œsophagus was pale; that of the larynx and trachea was rather yellow. Both lungs were adherent at some places; the pulmonary tissue was in a state of senile atrophy. The heart was normal; the ventricles contained a firm coagulum. The descending thoracic aorta was somewhat atheromatous.

The liver was small and its surface was slightly granular; its tissue was dense and of a nutmeg appearance; the bile-ducts were moderately dilated. The lesser omentum, the duodenum, and the pancreas were so intimately adherent to the under surface of the liver, that great difficulty was experienced in separating the several parts from one another.

The mucous membrane of the stomach and duodenum was dark-gray and softened, but free from ulcers or cicatrices. The Diverticulum Vateri,[1] and the openings of the ductus choledochus and of the pancreatic duct were normal, but above them was found a new opening, half an inch in diameter, with ulcerated margins; at this spot the ductus choledochus had ruptured through the coats of the duodenum. The gall-bladder contained purulent mucus and small black gall-stones; the cystic duct was obliterated; the mucous membrane of the gall-bladder was dark-gray and thickened. The ductus choledochus, as far as the site of its perforation into the duodenum, was dilated to double the normal size; its walls were thickened, and its mucous membrane intensely jaundiced; the dilatation of the bile-ducts extended uniformly into the parenchyma of both lobes. The portal vein was free from coagula.

The spleen was moderately enlarged, reddish-brown and softened.

The kidneys were small; their pyramids presented a somewhat jaundiced tint.

The mucous membrane of the intestinal canal was livid and softened; the contents of the bowel were tinged with bile.

OBSERVATION No. XL.

Accouchement five months before admission, and three weeks before commencement of an attack of Fever, with frequently-recurring Rigors.—Enlarged, painful Liver.—Enlargement of the Spleen.—Diarrhœa.—Suppuration of the Parotids.—Death during an attack of Dyspnœa.

Autopsy:—Large Abscess of the Liver.—Fistulous communication between the Gall-bladder and Duodenum.—Phlebitis Hepatica.—Metastatic Deposits in the Lungs.

K., a married female, aged 35, was under treatment in the Medical Clinique of the Charité Hospital at Berlin from the 15th to the 24th of July, 1861. The patient stated that she had never suffered from any disease, with the exception of a short attack of intermittent fever. Five months before admission she was confined, and she nursed her baby up to the commencement of her present illness. This, she stated, occurred three weeks before admission, and was characterized by headache, attacks of vertigo, rending pains in the limbs, and a violent rigor, followed by heat and sweating. The attacks of fever recurred daily, but at irregular hours. Profuse diarrhœa was soon superadded.

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[1] See p. 132, *note*.—TRANSL.

Since the 14th of July the patient had observed an inflammatory swelling of both parotids; she had difficulty in speaking, and stammered. The tongue was covered with a dry, brown coating, but the consciousness remained unimpaired. On examination the liver was found to be enlarged; it projected about two inches beyond the margin of the ribs, and measured 5½ inches along the mammary line. The spleen likewise appeared to be enlarged, extending two inches beyond the axillary line.

The right hypochondrium was tender upon pressure, down as far as the ileo-cæcal region. Bloody suffusions of the cutis, in the form of stripes, were observed over the left side of the abdomen.

The heart was normal, as were likewise the lungs, except a moderate catarrh of the bronchi. There were commencing bed-sores over the sacrum.

During the attacks of rigors the temperature rose to between 41°.8 and 42°.1 C. (107°.2 and 107°.8 Fahr.), and the pulse varied from 112 to 120; whilst in the intervals the pulse was only from 72 to 88, and the temperature was only 37° to 38°.1 C. (98°.6 to 100°.58 Fahr.).

The swelling of the parotid gradually diminished, until the 23d of July, the day before death.

All along, the tongue remained brown; the stools and urine were passed involuntarily; but the consciousness did not become obscured until the last day of life. Death occurred during a violent attack of dyspnœa.

Autopsy, 18 *hours after death.*

The liver was considerably enlarged; the anterior margin of the right lobe was adherent to the omentum as well as to the ascending colon. On removing these adhesions and the deposits of recent lymph, gluing the organs to one another, yellow drops of pus were observed at several places in the capsule of the liver. About an inch below the pylorus, the right wall of the duodenum exhibited a rupture the size of a silver groschen (6¼ Eng. lines in diameter), and here the duodenum was adherent to the under surface of the liver. The gall-bladder was enclosed in numerous false bands of adhesion; it did not exceed the size of a walnut, and was furnished with several diverticula; its mucous membrane was much swollen and covered with slate-colored cicatrices, and a deficiency, about the size of a sechser (equal to that of a threepenny-piece), at one part of its walls, corresponded to the above-mentioned perforation of the duodenum. The cystic-duct could be traced only a short way from the ductus choledochus. The last-mentioned duct was dilated and of a bilious tint, whilst the gall-bladder contained only a whitish, viscid fluid. The portal vein was empty. A fluctuating sac, four inches in diameter, from which a large quantity of thin, gray pus escaped, was found on the anterior surface of the right lobe of the liver. This sac occupied the anterior part of the right lobe of the liver, and extended to 3½ inches from the posterior rounded margin; it was surrounded by several small cavities of pus, with some of which it communicated. Discolored thrombi extended from the large abscess into the hepatic veins. The walls of the abscess were of a slaty-gray color, dense, and covered with trabecular elevations. The spleen was greatly enlarged; its pulp was friable. No abnormal conditions of any importance were found in the intestine.

The lungs contained several metastatic deposits, larger than a hazelnut, undergoing softening. The parotids were infiltrated with pus.

The origin of the hepatic abscess was obscure. The fistula between the duodenum and obsolete gall-bladder apparently resulted from a gall-stone, which had passed by this way into the intestinal canal. It is uncertain whether this had contributed to the formation of the hepatic abscess. The ductus choledochus was greatly dilated, but no gall-stones could now be found. The phlebitis hepatica resulting from the hepatic abscess had induced the metastatic deposits in the lungs. The morbid condition of the liver was of much older date than three weeks, and extended back to the time when the patient stated that she had been in good health. The abscess had existed for a long time in a latent state.

OBSERVATION No. XLI.

Pains in the Epigastrium and Right Hypochondrium.—Jaundice.—Green Bilious Vomiting.—Pear-shaped tender Tumor at the margin of the Liver.—Rigors.—Passage of Biliary Gravel, but no Calculi with the Stools.—Recovery.

Johanne Ritter, aged 29, a maid-servant, was a patient in the Medical Clinique at Breslau, from the 23d of February to the 21st of March, 1855.

She had always before enjoyed good health, but for fourteen days she had suffered from pinching pains in the epigastrium, extending towards the right side, and accompanied by nausea and loss of appetite. During the last four days these symptoms had increased greatly in severity, and the pains in the right hypochondrium were so intense as to interfere with the respiratory movements, and to render careful palpation intolerable. There was repeated vomiting of yellow mucus.

Jaundice set in as early as the 24th of February, and rapidly increased. The stools were white, and the urine contained bile-pigment.

After the application of cataplasms, the pains were relieved, the tension of the abdominal muscles abated, and a rounded elastic tumor could be felt on the right side external to the rectus abdominis muscle; this tumor was movable, very tender, and was the real seat of the pain; from its characters it was necessarily regarded as the distended gall-bladder.

On the 28th of February the patient had a rigor, followed by heat and sweating.

Decoction of Tamarinds with Sulphate of Soda was prescribed.

Great prostration; pulse 104, and small; no change in the gall-bladder; the stools continued white up to the 3d of March, on which date they presented a slight yellowish tint, and at the same time the pains ceased. Numerous, irregularly-formed, dark-brown granules, up to the size of a small lentil, were found in the stools. These granules were destitute of structure, and resembled the deposits found in inspissated, stagnant bile. They consisted for the most part of pigment; cholesterine could be obtained from the larger ones, by means of rectified spirit. Search was made for a calculus, but none was found. The brown granules were observed in the stools up to the 9th of March; from that date the color of the stools was normal, while the urine and the skin became paler; and on the 15th of March the patient was discharged, cured.

OBSERVATION No. XLII.

Faint Jaundice with slight Enlargement of the Liver.—Constipation.—Improvement after the use of the waters of Karlsbad.—Return of the same symptoms three months afterwards.—Obstinate Constipation, for which purgatives were administered without effect.—Fœcal vomiting, and other symptoms of Ileus.—Morphia, Enemata of Water, and subsequently of Infusion of Belladonna.—Passage of a Gall-stone the size of a walnut.—Recovery.

Count G., a healthy man, 50 years of age, resorted to Karlsbad, in the spring of 1856, on account of slight jaundice, accompanied by moderate enlargement of the liver and habitual constipation. Temporary improvement followed; but already in July, the color of the skin was again pale-yellow; the patient complained of dull pains in the right hypochondrium; the appetite ceased; and the bowels became more and more confined.

A state of constipation, lasting for several days, was gradually developed, which the ordinary medical attendant endeavored in vain to remove by means of Rhubarb, *Bitterwasser*,[1] Infusum Sennæ Compositum, &c. Calomel, which was tried at last, was equally without effect; vomiting set in; the abdomen became distended and more and more tympanitic, but remained free from pain.

The vomited matters consisted at first of a greenish-yellow mucous fluid; subsequently they assumed a dirty-yellow color, and became fœtid, and at last they emitted an unmistakable stercoraceous odor. At the same time there was dyspnœa, with great anxiety and cool extremities.

At my advice the purgatives were discontinued, and small doses of Morphia, together with Ice, were substituted, and the bowels were only acted upon by copious, oft-repeated enemata of tepid water. The vomiting ceased; the patient became more tranquil; but the bowels remained obstinately confined.

After the administration of an enema of Infusion of Belladonna leaves (gr. v. *ad* ℥ iij.) no change at first took place, but on repeating it in the evening, restless sleep, interrupted by delirium, with large pupils, and other symptoms of the action of Belladonna ensued. On the following day the enemata of tepid water were repeated; about noon the fluid that came away began to be colored, and about two o'clock a bulky fæculent stool was passed, with severe pain at the sphincter. In this stool a globular brown body, larger than a walnut, was discovered, which upon closer examination, was found to be a culculus composed of cholesterine, presenting a radiated structure and surrounded by a layer of dried fæces 4 lines thick.

The effects of the Belladonna lasted for several days longer, but were then followed by complete recovery.

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[1] See *note*, p. 214.—TRANSL.

OBSERVATION No. XLIII.

Intermittent Pain in the Right Hypochondrium, accompanied by Jaundice.—Removal of both by means of Purgatives.—Passage of a Tænia.—Return of the same symptoms.—Rounded doughy Tumor below the Liver, formed by Fæcal matter.—Jaundice.—Recovery after taking Senna.

Johanne Gutsche, aged 56, was a patient in the Medical Clinique at Breslau, from the 8th of July to the 10th of August, 1856.

She complained of having suffered fourteen days before from violent pains in the right hypochondrium, which came on suddenly, and were followed by slight jaundice. In the night between the 5th and 6th of July the pain returned with great severity, and was followed by persistent vomiting. A jaundiced tint was observed upon the skin and conjunctivæ, and likewise in the urine.

After several doses of purgatives the pains were alleviated, but they did not cease entirely until after the expulsion, by means of Kousso, of a large tape-worm.

Subsequently the bowels became again confined, and a rounded nodulated tumor, of a doughy character, and tender upon pressure, could be distinctly felt in the right hypochondrium. Jaundice had again made its appearance. After the bowels had been very freely moved by means of the Infusum Sennæ Compositum, the tumor, the pain, and the jaundice disappeared entirely in a few days. The form of the tumor, the jaundice, and the sudden commencement of the pain led to the diagnosis of gall-stones.

As an appendix to the history of gall-stones we shall consider, in the last place, the subject of *Neuralgia Hepatis.*

HEPATIC NEURALGIA.

(*Neuralgia Plexus Hepatici.*)

It has been long supposed that neuralgic affections may arise in the liver independently of the irritation of gall-stones, just as happens in the adjoining nervous plexuses of the stomach and intestine. This supposition, at all events, is supported by analogy; the question, however, is to prove it by unequivocal facts. There are as yet but few observations that can serve for such a purpose, and hence it is not to be wondered at that some pathologists doubt the existence of such a disease as simple hepatic neuralgia.

Andral (*Clinique Médicale*, Tom. II.) records the cases of patients who were cured of pains in the liver and jaundice, without any gall-stones being found in the stools. One of these patients died soon afterwards, and neither gall-stones nor any other lesions of the liver were found.

Observations of this sort, however, must always be used with caution, because even in undoubted cases of hepatic colic the discovery of gall-stones is not always possible; many gall-stones likewise return from the cystic-duct into the gall-bladder. At all events, Beau[1] goes much too far in endeavoring to prove by such facts that the great majority of cases of hepatic colic owe their origin to some other cause than the impaction of a calculus.

Beau believes that the principal cause of neuralgic pains in the liver consists in acrid ingesta, such as spirits, acrid spices, pepper, mustard, &c., carried with the portal blood from the stomach to the liver. By way of confirming his views, he gives the details of cases in which neuralgic pains, sometimes in conjunction with a jaundiced tint of the skin, were developed, either a few minutes or some hours after eating certain of the substances above mentioned. Without doubting the exciting influence which acrid ingesta may exercise over the hepatic nerves, I do not believe that they can be regarded as a sufficient cause of hepatic neuralgia. On such a supposition the disease ought to be infinitely more frequent than it is in reality. Allusion has already been made to the influence of gastric digestion upon the commencement of gall-stone colic, and many of Beau's observations may be explained in this way.

That neuralgic affections of the hepatic nerves may occur independently of gall-stones, admits, in my opinion, of no doubt. There are forms of neuralgia of this organ which in their mode of development, in their recurrence after intervals of a month, in their alternation with other affections of the nervous system, and in their whole progress, differ essentially from *Colica Calculosa*. Budd (*Diseases of the Liver*, p. 380) has already called attention to differences of this sort, as observed by himself mainly in hysterical females. The following case may serve in the way of further illustration.

OBSERVATION NO. XLIV.

Attacks of violent Pains in the Hepatic and Gastric Regions, accompanied by Vomiting, Slight Jaundice, and Clonic Spasms.—Regular Return of the Attacks at intervals of four weeks.—Recourse to the Waters of Karlsbad without any benefit.—Conversion of the pains into Intercostal Neuralgia.—Use of the Brine- and Whey-baths.

The Countess S. J., aged 23, in Silesia, had suffered for five years from periodic pains in the liver. In this period she had been twice confined, and during her pregnancies she had been free from pains in the liver. Since the patient's last confinement, in the year 1858, the attacks returned in a more violent form and recurred regularly every four weeks, shortly before the appearance of the menses. The liver became swollen, while the right hypochondrium and the epigastrium were the seats of acute, boring pains, recurring at short intervals, and also induced by the slightest touching of the part. The most tender localities were those corresponding to the pylorus and the fissure of the liver. These pains were accompanied by choking sensations and vomiting, and not unfrequently by clonic spasms; the countenance became reddened, and the conjunctivæ were colored yellow, while the urine assumed a dark-brown tint.

An attack of this sort usually lasted for twenty-four hours, but occasionally for two and a-half days.

For this affection, the patient had resorted to the waters of Karlsbad on three different occasions without receiving any benefit. She returned weakened and emaciated; the pains continued the same.

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[1] *Archiv. Générales de Méd.*, Avril, 1851.

On the patient's return to Berlin at the end of April, 1860, the characters of the disease had changed in many respects. The attack still always returned every month, and varied only about two days in the date of its appearance. It commenced for the most part between seven and eight o'clock in the evening, and continued till towards morning, or from ten to twelve hours. It began with severe pinching of the stomach, accompanied by an intolerable pain in the back, from the eighth to the twelfth dorsal vertebra, which extended over the hepatic region to the stomach, and was likewise felt in the left side, though less severely. This was followed by convulsive movements of the hands and feet, spasmodic eructations, and vomiting, first of the food, and afterwards of bilious mucus. The whole of the upper part of the abdomen was extremely tender when touched. The liver was increased in size; the respiratory movements were accelerated, whilst the pulse was slow and hard. The attack was always accompanied by active congestion of the countenance, noises in the ears, and muscæ volitantes.

The yellow color of the conjunctivæ and skin no longer made its appearance. The urine, however, continued brown, and did not assume the pale color characteristic of *urina spastica.* The relation of the paroxysms to menstruation was no longer observed; the menses had run their course ten or twelve days before the attacks commenced.

The Valerianate of Ammonia with Extract of Belladonna was prescribed. During the summer the use of the Brine- and Whey-baths at Ischl was recommended, and for the autumn, the Grape-cure.

There can be no doubt that the neuralgia in this case, which at first had its seat in the hepatic plexus of nerves, and afterwards took the form of intercostal neuralgia, was independent of gall-stones. During the five years that the patient was under careful observation, no gall-stones were ever passed, not even during the thrice-repeated use of the Karlsbad waters. Moreover, the opinion that there were other causes for the neuralgia, is supported by the regular return of the attacks at intervals of four weeks, by their cessation during pregnancy, and lastly, by their conversion into another form of nervous affection. It is also worth mentioning, that the patient before marriage had been subject to epilepsy.

The treatment of hepatic neuralgia, like that of cardialgia, is to be conducted with a due regard to the causes which give rise to it.

APPENDIX.

APPENDIX

OF OBSERVATIONS AND EXPERIMENTS IN SUPPORT OF THE STATEMENTS MADE IN THIS WORK.

No. I. (*Page* 27.) Echinococcus of the right lung and of the liver—Rupture of the hydatid in the liver and of the hepatic tissue, in consequence of a fall—Hæmorrhage into the hydatid sac—Sudden death.

No. II. (*Page* 29.) Blow on the hepatic region from a log of wood—Severe pain—An oval tumor at the margin of the false ribs—Sudden increase of the pain—Imperceptible pulse—Hydatids passed with the stools—Diminution of the tumor—Diarrhœa—Repeated attacks of rigors—Jaundice—Anæmia—Extreme exhaustion—Tedious recovery.

No. III. (*Page* 31.) Contusion of the right hypochondrium—Hæmoptysis—Persistent pains in the lower part of the right side of the thorax—The physical signs of a globular tumor, projecting upwards from the liver into the thoracic cavity—Purulent sputa—Hectic fever—Death from exhaustion.

Autopsy: Hydatid of the liver, communicating with an abscess of the lung.

No. IV. (*Page* 33.) Extensive, painful, fluctuating tumor of the liver of several years' duration—Dyspnœa—Dyspeptic symptoms—Cachectic appearance—Puncture of the tumor—Repeated rigors—Tedious convalescence—Recovery.

No. V. (*Page* 65.) Jaundice many years before death, followed by persistent intermittent fever with dropsy—Paralysis of the right arm—Painful, rounded tumors in the epigastrium, which increased very rapidly—Derangement of the stomach—Anasarca—Albuminuria—Pneumonia of the left lung—Death from pulmonary œdema.

Autopsy: Liver enormously enlarged, and containing numerous cancerous tumors—Enlargement of the hepatic artery—Hepatization of the lower lobe of the left lung—Advanced Bright's degeneration of the kidneys.

No. VI. (*Page* 68.) Dyspepsia—Jaundice—Emaciation—Painful nodulated enlargement of the liver—Diarrhœa—Exhaustion—Death.

Autopsy: Jaundiced discoloration of dura mater, air-passages, endocardium, and kidneys—Cancerous nodules in the liver, very vascular, and some of them depressed in the centre and reticulated—Constriction of the portal vein and of the hepatic duct by means of bands of connective tissue—Fibrinous exudations on the mucous membrane of the ileum and rectum.

No. VII. (*Page* 69.) Intermittent fever of four weeks' duration—Dyspepsia, nausea, vomiting—Jaundice without decoloration of the fæces—Painful swelling of the liver, with a smooth upper surface—Fluid effusion in the abdominal cavity—Death from exhaustion.

Autopsy: Numerous cancerous nodules in the liver—Cancer of the mucous membrane of the bile-ducts and gall-bladder—Enlargement of the left division of the hepatic duct, the branches of which were filled with ichorous fluid and tubular coagula—Bloody effusion in the peritoneal cavity.

No. VIII. (*Page* 71.) Persistent cough—Signs of a cavity at the apex of the right lung—Liver painful and nodulated, but not enlarged—Tumefaction of spleen—Ascites—Appetite good—Constipation—Paracentesis—Death from exhaustion.

Autopsy: Bones of cranium thick—Dilatation of bronchi and induration of the apex of the right lung—Mitral valves thickened and partly calcified—Cicatrices on the soft palate, and at the entrance to the vagina—Granular induration of the liver in conjunction with syphilitic cicatrices and cancerous nodules—Waxy spleen—Cicatrized ulcers of stomach.

No. IX. (*Page* 73.) Painful tumor on the right hypochondrium, afterwards extending into the epigastrium—Disordered digestion—Emaciation—Symptoms of pleurisy on the right side—Death.

Autopsy: Soft and hard cancerous nodules in the liver—Gall-stones—Purulent exudation in the right pleural cavity—Cancerous nodules in the right lung.

No. X. (*Page* 75.) Persistent derangement of digestion—Liver considerably enlarged, but free from pain, and its surface smooth—Rapid collapse—Death.

Autopsy: Liver very large and heavy, and containing numerous yellowish and blackish nodules—Isolated nodules of cancer in the retro-peritoneal glands, the lungs and the pleura—The tumors composed, for the most part, of connective-tissue cells—Old thrombus in the left branch of the portal vein.

No. XI. (*Page* 79.) Pains in the epigastrium—Disordered digestion—Slight jaundice—Liver enormously enlarged, slightly tender, and covered with fluctuating tumors—Fluid effusion in the abdominal cavity—Rapid increase of the ascites and sudden collapse—Death.

Autopsy: Numerous deposits of medullary cancer in the liver—Fatty degeneration and softening of the hepatic tissue—Rupture of fungating excrescences through the capsule of the liver, with extravasation of blood into the peritoneal cavity—Cancer of the left division of the portal vein, and a thrombus in the right division—Angular compression of the vena cava—Enlargement of the left branch of the hepatic duct—Cancer of the posterior wall, and of the lesser curvature, of the stomach—Compression of the splenic vein, which contained a decolorized thrombus—Slight enlargement of the spleen—Patches of ecchymoses in the mesentery.

No. XII. (*Page* 82.) Pains in the left hypochondrium, without any dyspeptic symptoms—Rapid emaciation—A hard, tender tumor at the margin of the left ribs, and a similar tumor on the right side—Sudden death from syncope.

Autopsy: Cancerous ulcer in the lesser curvature of the stomach—Adhesions between the stomach and the under surface of the liver—Cancer of the cœliac and hepatic glands, without compression of the bile-ducts or hepatic vessels—Numerous cancerous nodules in the liver, some of them as large as a fist—Slight peritoneal exudation, with fibrinous flakes.

No. XIII. (*Page* 84.) Symptoms of indigestion—Thin, sometimes bloody, stools—Rapid decline—Extensive, nodulated, and painful enlargement of the liver—Enlarged abdominal veins—Ascites—Slight Jaundice—Death under symptoms of pressure upon the brain.

Autopsy: Numerous umbilicated and fatty cancerous nodules in the liver, which was much enlarged and congested—Small cancerous mass in the posterior wall of the stomach—Tumefaction of the spleen—Apoplexy of the pia mater.

No. XIV. (*Page* 86.) Disordered gastric digestion — Constipation — Ascites—Prominences appreciable through the abdominal parietes—Increase of the ascites—Dyspnœa—Death.

Autopsy: Numerous deposits of hæmorrhagic cancer in the liver, on the under surface of the diaphragm, in the mesentery, and on the peritoneum—A cancerous mass, the size of a child's head, in the cœliac glands, situated in the lesser curvature of the stomach, communicating by an ulcer with the interior of this organ—Cancerous nodules in the right ovary.

No. XV. (*Page* 87.) Symptoms of indigestion—Constipation, alternating with diarrhœa—Hæmatemesis and bloody stools—Œdema of the feet—Large, painful, nodulated tumor in the left hypochondrium and in the epigastrium—Enlargement of the epigastric veins—Death under symptoms of cerebral paralysis.

Autopsy: Numerous cancerous nodules in the liver—Compression of the vena cava in the fissure of the liver—Scirrhus of the lesser curvature of the stomach, at some places infiltrated with colloid matter—Cancer of the retro-peritoneal glands.

No. XVI. (*Page* 89.) Long-continued pains in the region of the stomach, and vomiting—Symptoms of peritonitis from perforation—Death.

Autopsy: Purulent effusion into the abdominal cavity—Perforating cancerous ulcer of the stomach—Cancerous nodules in the liver.

No. XVII. (*Page* 90.) Pains in the hypochondrium—Loss of appetite and strength—Diarrhœa—Visible nodules in the right hypochondrium and in the epigastrium, depressed by inspiration—Œdema of the feet—Effusion into the pleuræ and peritoneum—Death from exhaustion.

Autopsy: Fungating excrescence on the wall of the stomach—Cancer of the liver—Cancerous nodules in the hilus of the spleen, encroaching upon the gland—Cancer of the omentum and peritoneum.

No. XVIII. (*Page* 92.) Repeated attacks of pains in the upper part of the abdomen and in the lumbar region—Derangement of the functions of the stomach—Obstinate constipation—Jaundice—Smooth swelling of the liver—Bile-pigment and albumen in the urine—Œdema of the feet—Emaciation—Loss of strength—Delirium—Somnolence—Death.

Autopsy: Hard cancer in the hepato-duodenal ligament, which accompanied Glisson's capsule as far as the ultimate ramifications of the vessels and bile-ducts, in the interior of the liver—Obliteration of the ductus choledochus—Cancerous nodules in the wall of the portal vein and in the serous membrane of the liver, duodenum, and pelvis—Scirrhous thickening of the pancreatic duct—Remains of a local peritonitis in the pelvis—Inflammatory infiltration of both kidneys.

No. XIX. (*Page* 94.) Disordered digestion — Vomiting of coagulated blood, and afterwards of brown fluid—Constipation—Jaundice—Distention and dulness of the epigastrium and right hypochondrium—No perceptible tumor—Death by syncope.

Autopsy: Very extensive ulcer, with smooth base, and terraced walls in the pyloric portion of the stomach—Its base and circumference in a state of cancerous degeneration—Extension of the cancer to the fissure of the liver, and along with Glisson's capsule, into the interior of the gland—Compression of the hepatic duct; cancerous degeneration of its walls—Enlargement of the bile-ducts—Compression of the portal vein—Dilatation of the veins of the small intestines—No tumefaction of the spleen.

No. XX. (*Page* 96.) Annular infiltration of the rectum, with ichorous discharge—Slight enlargement of the inguinal glands—Pains in the course of the ischiatic nerve—No obvious indications of disease of the liver—Marasmus—Death.

Autopsy : Cancer of the rectum, of the left lobe of the liver, and of the lumbar, hypogastric, and inguinal glands—Cancerous nodules in the muscular tissue of the heart.

No. XXI. (*Page* 97.) Dyspeptic symptoms—Jaundice—Emaciation—Two large tumors above the brim of the pelvis—Liver large and nodulated, with tight-lace fissures—Tenderness of the abdomen—Death from exhaustion.

Autopsy : Cysto-carcinoma of both ovaries—Cancer of the liver—Lymphatic vessels of the liver filled with cancer-cells—Cancerous lymphatic glands in the fissure of the liver—Compression of the portal vein—Enlarged hepatic artery—Cancer of the cœliac and lumbar glands—Cancerous nodules in the mucous membrane of the urinary bladder—Hydronephrosis of the right kidney, and cancerous infiltration of the left kidney.

No. XXII. (*Page* 100.) Alleged injury of head—Apathy—Loss of memory—Headache—Slow pulse—Ptosis and hemiplegia on the left side—Involuntary evacuations—Death under symptoms of cerebral paralysis.

Autopsy : Cancerous cyst, the size of an apple, in the anterior portion of the right hemisphere of the brain—Cancerous deposit, the size of an orange, infiltrated with extravasated blood in the right lobe of the liver.

No. XXIII. (*Page* 102.) Primary cancer of the left heel, removed by the galvanic cautery—Return of the disease after the lapse of a year—General cachexia—Death.

Autopsy: Extensive cancerous tumor of the heel, springing from the periosteum of the calcaneum—Secondary deposits in the course of the lymphatics of the leg and thigh, in the pia mater and in the lungs—Cystic cancer of the liver.

No. XXIV. (*Page* 118.) Repeated contusions of the epigastrium—Persistent, violent pains in the upper part of the abdomen—Great distention of the abdomen by fluid—Enlarged abdominal veins—Liver small and pressed upwards—Diarrhœa—Paracentesis—Rapid return of the effusion—Persistent diarrhœa—Death by exhaustion.

Autopsy: Appearances indicative of chronic peritonitis—Firm adhesions of the spleen, liver, and pancreas to the neighboring organs—Compression of the portal vein by a layer of connective tissue—Firm thrombus in the portal vein—Liver small and dense—Tumefaction of the spleen—Enlargement of the mesenteric veins—Lividity and tumidity of the mucous membrane of the stomach and intestines—Opaque, flaky effusions in the abdominal cavity.

No. XXV. (*Page* 127.) Disordered digestion—Symptoms of cramp of the stomach—Diarrhœa—Abuse of spirits—Violent pain—Sensation of rupture at the epigastrium—Prostration—Symptoms of Internal hæmorrhage—Death two days afterwards.

Autopsy: Copious extravasation of blood between the folds of peritoneum surrounding the portal and splenic veins—Extensive fatty degeneration of the walls of the portal vein and of its branches—Advanced fatty degeneration of the pancreas—Fatty liver, with hypertrophy of its framework of connective tissue.

No. XXVI. (*Page* 136.) Residence in a marshy country—Fever of three weeks' duration, believed to be typhoid—Acute pains in both hypochondria—Embarrassed action of the diaphragm, accompanied by a normal condition of the lungs—Profuse perspirations—Confined bowels—Repeated rigors—Very frequent pulse—Rapid collapse—Death.

Autopsy: Numerous adhesions of the abdominal organs—Several large abscesses in the spleen—Communication of these abscesses with the splenic vein—Wall of the vein rough and covered with pus and masses of firm coagula, as far as the portal vein—Reddish-brown coagula and pus in the hepatic branches of the portal vein.

No. XXVII. (*Page* 146.) Painful distention of the abdomen by a rapid effusion of fluid, in a person who was an habitual drinker—Elevation of the diaphragm—Dyspnœa—Bilious diarrhœa—Jaundice—Tumefaction of the spleen—Paracentesis—Rapid return of the ascites——Exhaustion—Delirium—Death.

Autopsy: Dense adhesions of the liver to the surrounding parts—Recent thrombi in the roots and branches of the portal vein—Thickening of the walls of the hepatic veins, with roughness of their lining membrane—Obliteration of several branches of the hepatic vein, and old coagula in their interior—Cartilaginous deposits upon the inner surface of the vena cava—Tumefaction of the spleen—Ecchymoses of the serous membrane of the intestines.

No. XXVIII. (*Page* 150.) Severe wound of the head by a fall—Delirium tremens—Gangrene of the wound—Repeated attacks of rigors—Tumefaction of the spleen—Jaundice—Death.

Autopsy: Fracture of the occipital bone—Suppuration of the Diploë—Softened thrombus in the sinus transversus—Metastatic deposits in the right lung—Bloody exudation in the pleura—Abscesses of the liver—Phlebitis hepatica suppurativa.

No. XXIX. (*Page* 156.) Fit of anger during menstruation—Symptoms of gastric catarrh—Jaundice—Pale stools, which regain their color in a few days after the use of rhubarb with carbonate of soda—Intermittent fever removed by means of quinine—Recovery.

No. XXX. (*Page* 157.) Repeated attacks of intermittent fever—Feeling of tightness in the epigastrium and right hypochondrium, lasting for four weeks—Jaundice—Employment of benzoic acid, an emetic, carbonate of soda and rhubarb, and aqua regia, without any effect upon the jaundice, which ultimately, after lasting fifteen weeks, disappeared under the use of the mineral waters of Karlsbad.

No. XXXI. (*Page* 158.) Intermittent fever cured by means of quinine—Urticaria—Jaundice, sometimes with pale and sometimes with colored stools—Persistent and profuse hæmorrhage from the stomach and intestines—Œdema of the feet—Ascites—Death from exhaustion.

Autopsy: Small, somewhat indurated, liver, presenting patches of an olive-green color, in which the capillary bile-ducts were dilated—Destruction of a portion of the capillaries of the portal vein—No ulceration of the mucous membrane of the stomach and intestines.

No. XXXII. (*Page* 164.) Pains in the right side—Fever—Constipation—Vomiting of bitter, greenish matter—Cough, with mucous expectoration—Aggravation of the pains in the region of the liver—Pleuritic friction—Repeated vomiting—Rigors—Painful distention of the abdomen—Slight jaundice—Increasing exhaustion—Death.

Autopsy: The enlarged ductus choledochus and the branches of the hepatic ducts, filled with yellow, semi-solid concretions—Inflammation and ulceration of the mucous membrane of the biliary passages—Abscess in the liver, as large as a child's head—Perforation of the capsule of the liver by another abscess of smaller size—Escape of bile into the abdominal cavity—Peritoneal exudation—Slight pleurisy and circumscribed pneumonia—Bronchial catarrh.

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